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A STUDY ON STUDENTS' PERCEPTION OF STATISTICS EDUCATION IN BUSINESS SCHOOLS

Article Particulars

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AARTI MEHTA SHARMA
Research Scholar of Shri JJT University Jhunjhunu, Rajasthan &
Assistant Professor with Symbiosis Institute of Business Management
Constituent of Symbiosis International (Deemed University), Pune, India

DR SWATI SUBHASH DESAI
Associate Professor, Department of Maths/Stats
P.D.Lions College of Commerce and Economics,
Malad West Mumbai, India

Abstract

In today's world data analysis is the buzzword. This term refers to qualitative and quantitative techniques and processes which are used to enhance productivity and make higher profits.It is the science of extracting trends, patterns and useful information from a set of existing data and the ability to apply it to business problems successfully. As data and information increase rapidly, the growth rate of information is so high that the information available to us in the near future is going to unpredictable. Data is continuously generated through hundreds of users and businesses and the same is modelled, visualised and applied to make higher profits for the company. As we move into a more digital world, gathering data is not a problem, analysing, getting insights and making predictions on the said data to gain advantage in business has become the urgent need of the hour. It is imperative for students of management to learn to use data wisely for decision making. The Business Statistics course is taught to MBA students in the first year in India and although many statistics teachers enjoy teaching the subject, they find that the joy of gaining insights and discovering hidden trends is totally lost to students. Hence, it is important to know about student's perceptions towards the subject and its utility to them in the workplace. Thus this paper is topical as it explores Business student's perceptions towards Statistics which is a large part of analytics and required in today's business world more than any time in the past.

***Keywords**: insights, trends, analytics, statistics, perception, students, business*

Introduction

Students' attitudes and beliefs can impede (or assist) learning statistics, and may affect the extent to which students will develop useful statistical thinking skills and apply what they have learned outside the classroom. (Gal,1997) It is imperative to understand the reasons for most students not being enamored of the subject and in fact experiencing "statistical anxiety", considering the massive applications it has in

decision making in today's business life. The objective of this study is to find out the perception of business students towards the field of Statistics and its use later when they are in the workplace.

Materials and Methods

The paper starts with a Literature Review, followed by Objective and Hypothesis, data analysis, Results and Discussion and lastly the conclusion.

Literature Review

"Statistics anxiety" describes the apprehension that occurs when an individual is exposed to statistics content or problems and instructional situations, or evaluative contexts that deal with statistics. As statistics-anxious individuals always experience anxiety when doing statistics, statistics anxiety describes an enduring, habitual type of anxiety (Onwuegbuzie and Wilson, 2003; Macher et al., 2012).

Burrus & Steinberg (2013) identified four categories of competencies as needed in the twenty first century workplace: analytic skills, interpersonal skills, information processing, and capacity for change. The top five ranked components in their paper corresponded to three of these categories: problem solving (analytic skills), fluid intelligence (analytic skills), teamwork (interpersonal skills), achievement/innovation (capacity for change), and communication skills (interpersonal change).

Carnell (2008) states that students often enter an introductory statistics class with less than positive attitudes about the subject. They tend to believe statistics is difficult and irrelevant to their lives. Earlier observational evidence from previous studies suggested that including projects in a statistics course may enhance students' attitudes toward statistics. Carnell conducted a study which examined the relationship between inclusion of a student-designed data collection project in an introductory statistics course and 6 components comprising students' attitudes toward statistics. The sample consisted of 42 college students enrolled in an introductory statistics course. Comparisons of those who completed the student-designed data collection project (n = 24) and those who did not complete the project (n = 18) suggest that inclusion of a project may not significantly impact students' attitudes toward statistics

Chan, Ismail (2012) believe that owing to the abstract natures of statistical concepts, students are often misled, paving the way to misconceptions in statistical reasoning. Previous studies have indicated that integration of technology has a positive impact on addressing misconceptions and improving students' statistical reasoning. In their paper, statistical reasoning has been introduced briefly. They have conducted an overview of studies on the usage of information technology to develop statistical reasoning. Four barriers have been identified – some applications leading to further misconceptions, students being too dependent on computers and thinking that all the outcomes attained using technological tools for statistics are correct, getting

bogged down by technical complaints of computers and students feeling that statistics is not relevant to everyday life. The authors conclude by emphasizing that that incorporating information technology in the statistics classroom is feasible due to its advantages although there could be some obstacles that can be overcome.

Frischemeier et. al (2016) comment that exploring micro data requires the ability to use digital tools for managing large multivariate data as digital tools allow changing easily between different uni- and multivariate displays and summary statistics. In their study they examined the suitability of several digital data analysis tools for exploring a large, multivariate socio-economic dataset, ranging from educational tools (TinkerPlots, Fathom) to professional software (R). They comment that the former are easier to use as compared to the latter. Another software, Fathom offers more formal procedures of analyzing data than TinkerPlots and also enhances an exploratory data analysis style. Thus, comparing distributions in regard to center, spread, shift, skewness or other aspects (p-based and q-based) can be done easily via switching between representations and identifying crucial summary statistics in TinkerPlots and Fathom. However, limitations arise when exploring multivariate data. R, on the other hand is a powerful tool for advanced learners and professional users and offers a whole landscape of powerful displays to explore multivariate data with visualisations, 3d graphs, text mining, regression trees, etc. The learning curve for R is comparatively steep which could be challenging for novice users.

Bond et.al 2012 contend that although statistics education research has focused on students' learning and conceptual understanding of statistics, researchers have only recently begun investigating students' perceptions of statistics. Most students acknowledged the usefulness of statistics. The authors collected perception of students towards the subject before and after a course and found that toward the end of the course, most students thought of statistics as inferential statistics (59%). At the beginning of the semester, most students thought statistics was about analysis and interpretation of data (26%), followed by using equations (23%), but by end of the course the majority of the students realized the usefulness of statistics. Almost half (49%) of the participants perceived that statistics was about analysis and interpretation of data, and 27% thought that statistics was about understanding real-life using different statistical models.

Ashaari et.al (2011) point out that Statistics is a structural method to solve a problem and is frequently used in various fields including information and communication technology (ICT). The importance of the subject leads to making the subject compulsory to be offered to students in Higher Education Institutes in Malaysia. A vast majority of the students find the subject difficult due to non-cognitive factors like attitude, perception, interest, expectation and motivation. Cognitive factors also play significant roles in contributing to the capability of the students excelling in this subject. The students have given great effort and are prepared to learn statistics course.

However, they feel that this course is not relevant for their field of study, as well as for their future career. This discovery is in line with the finding in previous researches by Kennedy &McCallister (2001) and Mills (2004). To make this course enjoyable, not frustrating, less frightening and more effective for the students, attention from the academic staff on students' perspectives and attitude towards the experience in learning statistics is vital. Lecturers need to be aware of how students show changes in behaviours according to the learning experience and the effect from their achievement, efforts to improve their knowledge, and attempts in applying the knowledge and skills of statistics in their daily life.

Harraway, Barker, R. J. (2003)list the statistical techniques most widely used in the workplace by 337 biological sciences research graduates. Their research indicates that introductory methods, including descriptive statistics, basic tests, simple linear regression, the analysis of variance and multiple comparisons, are taught to most of the students but there are gaps in the teaching of modelling and multivariate techniques. In addition, there should be greater exposure to survey design, power analysis, mark-recapture models, simulation and bioinformatics

Reid &Petocz (2002) reported on the results of an empirical study of students' conceptions, or understanding, of statistics. Six qualitatively different conceptions are described, ranging from fragmented to inclusive views. Students expressing the more inclusive and holistic conceptions approach their study of statistics through a focus on 'higher-order' statistical thinking Students expressing limited and fragmented views may not be able to understand the complexity or applications of the discipline. The authors point out that curriculum needs to accommodate variation in student conceptions, both because this variation exists and in order to help students broaden their awareness of statistics. They further contend that to consider the broadest and most inclusive conceptions of statistics, curriculum also needs to encourage students to be aware of their perception of their own place in the workplace and how statistics can help them in this endeavour.

Objective

The objective was to understand the perception of students toward Statistics. This study is limited to the second year MBA students of Symbiosis Institute of Business Management, Bengaluru, who have finished a course on business statistics in the first year.

The following hypothesis were checked through this study

H_{o1}: Students perceive that the knowledge of Statistics is useful for their career

H_{o2}: Students perceive the study of Statistics to be enjoyable

Data Analysis

The analysis starts by examining the demographic variables. There were a total of 25 respondents out of which 10 were female and 15 were male respondents. A majority

of the students did not have work experience (Fig 1) and were from an Engineering background (Fig 2). Out of the 25 respondents, 11 students were from Operations specialization followed by Marketing, Finance and then Human Resources Management (Fig 3).

Figure 1

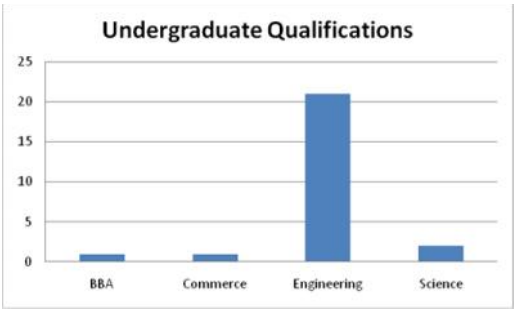


Figure 2

Figure 3

This was followed by an open ended question to understand what students thought about the need of learning statistics. The question was "Why do you think Business Statistics / Quantitative Techniques is taught to business students?" Most of the responses talked about decision making and data analysis. A few also mentioned financial modeling and forecasting. The data was analysed using the methodology of text mining on the R software. A word cloud was formed as is given below. From this it is clear that the foremost reason to study statistics is as it helps in analyzing data and for making decisions. The next question was to understand the utility of statistics as perceived by students. The students were given a set of statements and asked the question given below.

"Indicate what you really think about Statistics by putting a tick in the box corresponding to Strongly Agree, Agree, Undecided, Disagree or Strongly Disagree". Strongly Agree was given a weight of 5 and Strongly Disagree was given a weight of 1. The weighted mean for each statement was calculated and has been written.

Table 1

	Item	Mean
1	Statistics is enjoyable and stimulating to me.	4.12
2	Statistics is not important in everyday life.	2.08
3	I have never liked Statistics, and it is my most dreaded subject.	1.84
4	There is nothing creative about Statistics; it's just memorizing formulas and things.	1.8
5	Students who have understood the Statistics they have studied will be able to solve any assigned problem in five minutes or less.	3.56
6	I try to learn Statistics because it helps develop my mind and helps me think more clearly in general.	4.2
7	Using the web (or a computer) is a good way for me to learn Statistics.	3.72
8	Everything important about Statistics is already known by mathematicians.	2.48
9	Statistics makes me feel uneasy and confused.	2
10	Statistics is needed in order to keep the world running.	4
11	Statistics is a solitary activity, done by individuals in isolation.	2.2
13	Statistics is important for my chosen profession.	4.36
14	Statistics is needed in designing practically everything.	3.92
15	Communicating with other students helps me have a better attitude towards Statistics.	3.92
16	I am interested and willing to acquire further knowledge of Statistics.	4.28
17	Real Statistics problems can be solved by common sense instead of mathematical rules.	2.6
18	The skills I learn in this class will help me in other classes.	4.12
19	Ordinary students cannot expect to understand Statistics, they expect simply to memorize it and apply what they have learned mechanically an without understanding.	2.64

From the above analysis it is clear that students perceive that statistics is an essential part of the business management course and will lead to better decision making. Out of the above 19 items, 6 were taken to be measuring utility and 12 were measuring enjoyment. Both had positive and negative statements.

Table 2

Work (Usefulness) Related Items	
Positive Items	**Weighted Average**
Students who have understood the Statistics they have studied will be able to solve any assigned problem in five minutes or less.	3.56
Statistics is needed in order to keep the world running.	4
Statistics is important for my chosen profession.	4.36

Statistics is needed in designing practically everything.	3.92
The skills I learn in this class will help me in other classes.	4.12
Average	**3.992**
Negative Items	
Statistics is a solitary activity, done by individuals in isolation.	**2.2**

The data given in Table 2 is for items that are linked to the utility of the course, while a student or later in the work life. The item "Statistics is important for my chosen profession" scored a high 4.36 and the item "The skills I learn in this class will help me in other classes" with an average of 4.12 reinforce the same point, which is that business management students find the course useful. The cumulative average for this is 4.03. On the other hand the negative statements have appropriately got a low average. The item "Statistics makes me feel uneasy and confused" got a low score of 2.

Table 3

Subject Related Items	
Positive Items	**Weighted Average**
I am interested and willing to acquire further knowledge of Statistics.	4.28
Statistics is enjoyable and stimulating to me.	4.12
I try to learn Statistics because it helps develop my mind and helps me think more clearly in general.	4.2
Using the web (or a computer) is a good way for me to learn Statistics.	3.72
Communicating with other students helps me have a better attitude towards Statistics.	3.92
	4.03
Negative Items	
Statistics is not important in everyday life.	2.08
I have never liked Statistics, and it is my most dreaded subject.	1.84
There is nothing creative about Statistics; it's just memorizing formulas and things.	1.8
Everything important about Statistics is already known by mathematicians.	2.48
Statistics makes me feel uneasy and confused.	2
Real Statistics problems can be solved by common sense instead of mathematical rules.	2.6
Ordinary students cannot expect to understand Statistics, they expect simply to memorize it and apply what they have learned mechanically an without understanding.	2.64
	2.20

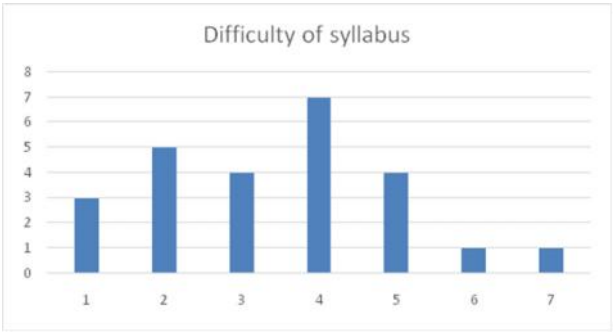
The other set of items which is shown in Table 3 is related to the subject. The item "I am interested and willing to acquire further knowledge of Statistics" got an average of

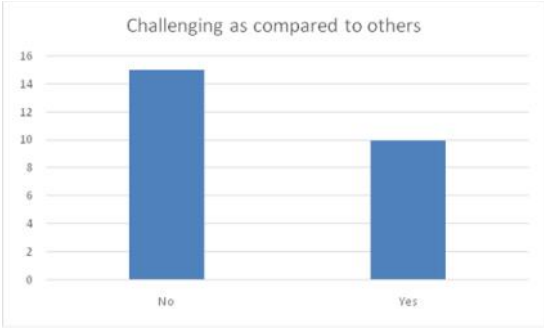
4.28 and the item "Statistics is enjoyable and stimulating to me" got an average of 4.12. These high averages show that students find Statistics to be an enjoyable subject. The item "I have never liked Statistics, and it is my most dreaded subject" got a low score of 1.84 and the item "Statistics makes me feel uneasy and confused" got a low score of 2.

The next question was on the level of difficulty. Respondents were asked "On a scale of 1-7 (where 1 = not at all difficult and 7 = very difficult) how difficult for you was the syllabus covered in this course?"The breakup of responses was as given in the bar chart below. The maximum response corresponded to 4 and the weighted mean was 3.44 which means that students did not find the course very difficult or very easy.

The follow up to this question was a comparison to other courses where students were asked "Did you find it more challenging as compared to the other courses you had in the same semester?" A majority of the students (15) said no.

Figure 4 **Mean = 3.44**





Conclusion

From the sample that data has been collected it is clear that students perceive the usefulness of Statistics and also find it enjoyable. Hence hypothesis 1 is accepted and hypothesis 2 is also accepted.

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