PERCEPTIONS OF UNDERGRADUATE AND EXECUTIVE STUDENTS ABOUT THE USE OF AN EXERCISE-BASED STATISTICS WEBSITE

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The purpose of this paper is to analyze the perceptions of undergraduate and executive students of a business course regarding the experience with an exercise-based statistics website. This particular website has multiple-choice questions designed for students who are taking basic statistics courses. By providing other types of resources (videos, textbooks, lists of exercises, lecture notes) to the students, it was possible to verify, at the end of the course, preference, efficacy and use of the site compared to all available resources. Results of a survey with the students show that offline resources were slightly preferable than online resources but, whether online or printed, most of the students considered exercises more helpful than any other resource type. Regarding the experience with the site, students agreed that the site collaborated to their learning and most of them were more motivated to learn statistics.

INTRODUCTION

In last 20 years, technology has been changing the way statistics is taught (American Statistical Association, 2010). One of the first authors that emphasize the use of technology is Cobbs (1992). He wrote a report with recommendations for teaching statistics to undergraduate students and one of the recommendations includes the use of technology. Since then, tools such as spreadsheets, free statistical software, applets, mobile apps, videos, and other online resources are increasingly used in introductory statistics courses all over the world.

Moreover, interest on introductory statistics course has also increased over last decades. Enrollments in the Advanced Placement Statistics Exam, which is offered to high school students all over the United States, has increased 20 times over the last 15 years (Roberts, 2012). In fact, this increase goes beyond undergraduate courses. Many executives are interested in statistics courses. The need for statistical analysis in large companies, the advent of big data and the valuation of the profession in the media creates a new target audience for statistics courses.

Therefore, given the availability of technology and the great interest of executives and undergraduate students, one question of interest is: which is the best resource for teaching statistics to these audiences? What kind of resource is perceived by the students to be the most effective: online resources or offline resources such as traditional books, printed exercises and lecture notes?

To investigate these issues, an exercise-based statistics website and videos, as well as offline resources, were available for students. The perceptions of the students concerning the website and other resources was investigated through a survey with a sample of undergraduate students from one of the best and most traditional business schools of Latin America. Another sample of Executive MBA students was also surveyed, as this is a population that has an increasingly interest in statistics course.

POPULATIONS, SAMPLES AND DATA COLLECTION

The first population consists of undergraduate students who attended my statistics course in the 2nd half of 2013 at FGV-EAESP Business School. Most of them are 18 years old and belong to middle/high classes. They have a good mathematics background and the majority came from the best high schools of the country. There were 40 students in this class.

The second population consists of MBA/Executive students who attended my statistics course in November 2013. They are very heterogeneous in age (varies from 20 to 60), profession (economists, psychologists, lawyers, mathematicians, etc) and background in mathematics. There were 50 students in this class.

The questionnaire was available on the website www.statmeup.com.br/enquete and during the last class all students were asked to access the link and answer the questionnaire. A second

warning was sent by email since some students were not present and others did not answer the questionnaire.

Twenty two out of 40 undergraduate students and 32 out of 50 executive students answered the questionnaire. Therefore, the samples are non-probabilistic.

COURSES

The first statistics discipline, given to undergraduate students at FGV-EAESP, is a 60-hour, 15 week discipline. It is a mandatory discipline students attend in the second semester of the undergraduate course in Business Administration. The syllabus of the discipline includes descriptive statistics, probability distributions, simulations and inference for the mean and proportion.

For the executive students, statistics is a mandatory discipline split in 6 classes of 4 hours each. The syllabus of this discipline includes descriptive statistics and basic regression analysis.

RESOURCES

Resources available for the students are divided in two types: offline and online.

Offline resources are the ones that are not under the direct control of a system (National Communications System Technology & Standards Division, 1996) and do not need a computer connected to operate. Textbooks, printed exercises, lecture notes and printed PowerPoint presentations are off-line resources available to the students.

Online resources are the ones that need direct control of a system or device. Videos at www.youtube.com/statmeup and exercises available at www.statmeup.com.br are examples of resources that can be used only when the student is connected to an electronic device.

The website contains more than 100 multiple-choice exercises divided into five topics: descriptive statistics, probability distributions, inference, simple regression and multiple regression. All exercises were prepared by statistics professors and have feedback for each alternative the student may choose. Exercises are not downloadable and some of them have an excel file attached to it with the data necessary to answer the question. Most of the exercises contain real data, in accordance to the recommendation of the College Report (American Statistical Association, 2010).

RESULTS

The results of the survey will be presented in two parts. First, results related to the use and helpfulness of different types of resources are shown.

The questions about the use and helpfulness of the resources follow:

Q1	Do you use the textbook to study for the statistics course?
Q2	Do you use lecture notes to study for the statistics course?
Q3	Do you use the professor´s powerpoint presentations to study for the statistics course?
Q4	Do you watch videos about statistics to study?
Q5	Do you do lists of exercises handed by the professor to study for the statistics course?
Q6	Do you do exercises of statmeup site to study for the statistics course?

Students were asked to answer the questions in a 5-point scale with the following categories:

1 – I do not use/watch/do
2 – I use/watch/do, but it didn´t help me in learning
3 – I use/watch/do, and it somewhat helped me in learning
4 – I use/watch/do, and it helped me in learning
5 – I use/watch/do, and it helped me a lot in learning

Graph 1 shows that the resource most used (percentage) by both undergraduate and executive students are lecture notes (100% of the undergraduates and 97% of executives). Textbooks are used only by 59% of executive students, maybe because it is a short course and they didn´t buy the textbook. Videos are used by 57% of the executive students – the resource least used by them. 59% of undergraduate students use exercises from statmeup site; all other resources are used by at least 77% of them.
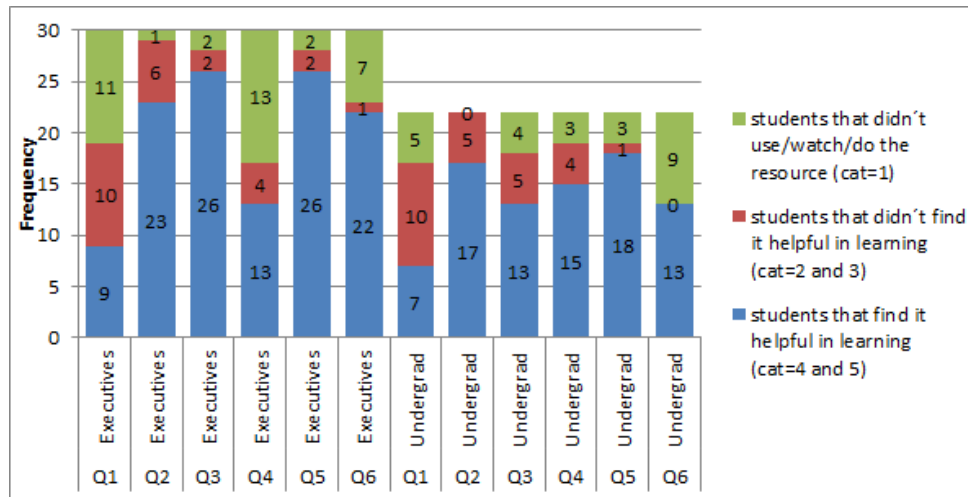
Graph 1. Frequency of answers by question, in each sample.

Concerning the helpfulness of the resources used, textbooks were not considered helpful by 53% of executives and 59% of the undergraduate students. The most helpful resources are exercises: lists were considered useful by more than 90% of users in both samples and statmeup exercises were considered useful by more than 96% of users in both samples. When comparing the answers among resources, 50% of undergraduate and 70% of executive students considered that exercises – whether online or not – were more helpful than other resources. Undergraduate students perceive offline and online resources equally helpful, whereas 50% of executive students consider offline resources more helpful, 30% consider online resources and 20% are indifferent.

Question 7 asked how many exercises the students have done. Among undergraduate students, 18 (82%) accessed the site and, among these, 39% answered more than 20 exercises. Among executive students, 22 (73%) accessed the site and, in this group, 7 (32%) answered more than 20 exercises.

The following questions of the questionnaire are related to the use of the site.

Q7	Is the site easy to use?
Q8	Is the site navigation intuitive?
Q9	Are the exercises on the site interesting?
Q10	Are feedbacks and solutions to the exercises helpful to understand the subject?
Q11	Do exercises motivate me to study statistics?
Q12	Do exercises collaborate to my learning?

The scale used in questions 7 to 12 is a 5-point Likert as follows:
1- Totally disagree
2- Disagree
3- Do not agree nor disagree
4- Agree
5- Totally agree

Graph 2 shows the frequency of each response to the questions related to the use of the site. Among users (18 undergraduate and 22 executive students that accessed the site): 95% of executives and 78% of undergraduates agree that the site easy to use; 95% of executives and 83% of undergraduates agree that the navigation intuitive; 100% of executives and 83% of undergraduates agree that the exercises are interesting; 91% of executives and 89% of undergraduates agree that the feedback and the solutions to the exercises were helpful in learning; 95% of executives and 55% of undergraduates agree that they were more motivated to study; and finally, 100% of executives and 94% of undergraduates agree that the exercises of the site collaborated to their learning.
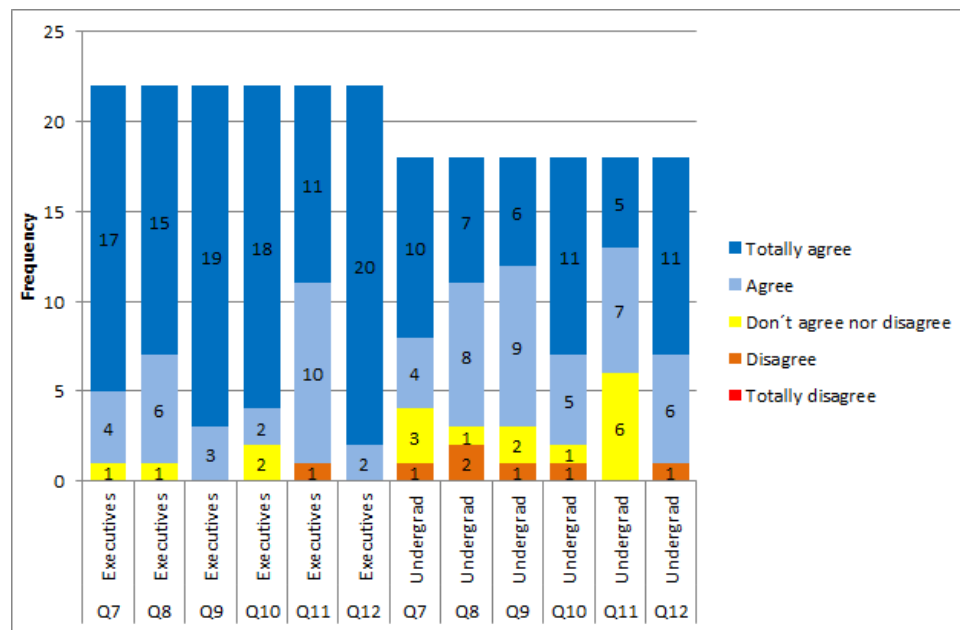
Graph 2. Frequency of answers about the site by question, in each sample.

DISCUSSION

The survey shows that the site was effective in motivating the undergraduate and executive students and it collaborated to their learning. Most of the students in both samples used the site to study for the course, as well as other resources such as lecture notes - the most used resource. Each available resource – online and offline - was used by at least 50% of the students in each group.

Among all resources, students perceive that exercises – whether online or offline – were the most helpful in their learning. On the opposite side, textbooks were not considered helpful by roughly half of the users in both samples. In the executive students sample, the textbook was not so used because of the characteristic of the MBA courses, where textbooks are deprecated in relation to handouts and students have less time to study.

These results indicates that students value more resources that go straight to the point, such as exercises, and help them to pass the exam; it doesn´t matter if it is online or not.

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