

BoostEdu Case study

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Abstract/Introduction

Motivation/Goal/Starting point

The project BoostEdu aims, among other things, to develop and promote digital tools and methods for tertiary education in Europe. For the purposes of the project, a set of teaching modules was chosen, where ideas could be shaped, planned, and implemented. The goal of the project was to increase the skills of teachers in the use of digital tools, both for in-situ teaching and for blended or distance learning formats. Secondly, the aim was to train students' transversal skills using a range of digital tools and methods.

This case study focuses on two courses of similar nature, teaching quantitative methodology, one course at bachelor level and the other at master's level. The courses cover similar topics, teaching data analysis and communication. The bachelor course is a compulsory course for all programs within the business and social science departments, while the masters level course is specific to only one program within the department of business.

Background of the case study

Bifröst University was founded in Reykjavík Iceland in 1918. Comprised of three faculties, the university offers degrees in Business and Management, Law and Social Sciences. At Bifröst, students' learning experience is largely project based where great emphasis is placed on practical and cross disciplinary projects, while course material is delivered using techniques of blended and distance learning. By its diverse academic staff, in addition to experienced part-time adjuncts, students are exposed to valuable insights and experiences from both the public and private sectors. Emphasis on developing teaching methods is of great importance at Bifröst University and this is evident, for instance from the mission statement of the university, which states that Bifröst will be on the cutting edge in its course offerings and methods of instruction. These are further shaped by the university's emphasis on social responsibility and sustainability. Bifröst University is a signatory of the United Nations' supported Principles for Responsible Management Education (PRME).

Bifröst University has the objective of preparing students for leadership positions in society, emphasizing the University's values: initiative, responsibility, and cooperation. In addition to core subjects pertaining to management, law, economics and political science, the curricula

include courses covering research methods (qualitative and quantitative) and introductory courses in statistics and data analysis.

The quality system of Bifröst University is called Bifröst University Quality Assurance Policy and is available online: <http://www.bifrost.is/files/international/gaedastefna-haskolans-a-bifrost-ensk-utgafa.pdf>. The Icelandic Quality Enhancement Framework (QEF) provides an environment within which all Higher Education Institutions (HEIs) in Iceland, individually and collectively, secure the standards of all their degrees, and systematically enhance both the students' experience and the management of their research efforts. The development of the QEF is administered by the Quality Board for Icelandic Higher Education. HEIs are reviewed under this framework, normally in a five-year cycle, but internal work on quality enhancement is continuous and ongoing.

Bifröst's faculties employ 31 academic staff, in 22,7 full-time equivalent positions. Bifröst is one of four Icelandic Universities with fewer than one thousand students, with 973 students registered for the academic year of 2022/2023. This figures includes bachelor, master and vocational programs. The main offices and physical teaching facilities of the university are located at Biföst, west Iceland, approximately 100 kilometers from Reykjavík. All academic programs at Bifröst are either distance or blended learning programs, so most teaching takes place online, through asynchronous lectures or live online classes and workshops. Each course still typically organizes one or two campus-based sessions, where students and teachers convene at Bifröst for in-situ classes, workshops and other groupwork.

Course rationale

The BoostEdu Strategic Partnership has offered a chance to gather and share knowledge of teaching methods and to reflect on prior course structures. This case study covers the work done for two courses that both train students in statistics and quantitative data analysis. The courses are Introductory Statistics and Market Research, the first being taught at bachelor level and the latter at master's level.

Introductory Statistics (Course reference: 901.6.0.TÖLF Tölfræði)

The aim of the course is for students to become familiar with the basics of probability and statistics and to be able to apply statistical methods when interpreting data. The collection of data with different sampling methods is discussed and some common sources of error associated with such surveys are explained. Conducting hypothesis tests for means and proportions and estimating confidence intervals for such quantities is reviewed. Nonparametric hypothesis tests for numerical variables and hypothesis tests for relationships between categorical variables are also discussed.

Finally, the use of linear regression analysis in the creation of simple and multidimensional prediction models is covered.

The course is obligatory for all study lines in the bachelor programs from the Department of business and the programs for the Department of Social Sciences.

Students entering the bachelor program in Business Administration have an alternative of completing their studies under one or more of the following emphases:

- BS in Business Administration with emphasis in finances
- BS in Business Administration with emphasis in Marketing
- BS in Business Administration with emphasis in sustainable management
- BS in Business Administration with emphasis in Service Management
- BS in Business Administration with emphasis in Project Management
- BS in Business Administration with emphasis in Business Intelligence
- BS in Business Administration with emphasis in Retail Management
- Diploma in Business Administration and Retail Management

From the Department of Social Sciences, students can graduate from the following programs.

- BA in Philosophy, Politics and Economics (PPE)
- BA in Media and Public Relations
- BA in Public Administration
- BA in Creative Industries
- Diploma in Public Administration
- Diploma in Philosophy, Politics and Economics (PPE)

The course on Introductory Statistics is taught in the spring semester, for a duration of 13 weeks (including the exam week). The number of students has ranged from around 90 to 120 in recent years. During the semester, students work on a series of assignments that they hand in individually or in groups of up to 4. The assignments train them in calculating statistics and interpreting findings, thus being able to apply the methods in practice. Before the course review done during BoostEdu, the first assignment tested the basic concepts for descriptive statistics and probability. The assignment was based on textbook suggestions, with generic data sets and did not offer much in terms of context that students in such a large group would relate to. The assignment still covered the key concepts, as students were familiarizing themselves with the objectives and terminology of the subject.

The following table breaks down the estimated learning hours for students taking the course, and indicates the division between individual and team work.

Quantity	Unit	Hours	Total	Self-work	Team-work
12	Lectures	2.5	30	x	
12	Reading	3	36	x	
2	Campus sessions	4	8		x
3	Individual projects	12	36	x	
2	Group projects	12	24		x
4	Workshops	4	16		x
			150		

Market research (Course reference: 134.6.0.MARA Markaðsrannsóknir)

The course discusses the importance of market research within the marketing sector, different types of research, the process of market research and analysis of the results. Knowledge of the market environment is essential in managerial decisions, strategic planning and in the preparation of marketing and action plans. The course is project-driven, and students work in groups throughout the semester, reaching sequential milestones to conduct all the key steps of an actual market research as part of the course. Student's are evaluated regularly during the semester, as work progresses from initial planning, through implementation, culminating in a presentation for the class forum.

The course teaches Market research, within a program on master's level in Marketing Management. The full degree is 90 ECTS, and can be completed along either of the following two study lines; an MS degree including a 30 ECTS final thesis, or an MMM degree when completed through courses and shorter projects.

The program mainly attracts students aspiring for careers within marketing. The course is one of only two within that degree that focus on quantitative methods for marketing managers. The course is particularly important for students who plan to specialise in marketing surveys and research, and for those who follow the MS line (rather than MMM) and expect to include quantitative data gathering and analysis in their thesis work. The course teaches the fundamentals of market research, including an overview of common methods and application. The course is project-based, as most of the student's consists of designing and conducting a market research of their own, starting from the outset of the

course, through the whole semester, and presenting findings towards the end of the semester

The following table breaks down the estimated learning hours for students taking the course, and indicates the division between individual and team work.

Quantity	Unit	Hours	Total	Self-work	Team-work
10	Lectures	1	10	x	
10	Reading	2	20	x	
2	Campus sessions	4	8		x
3	Projects	6	18	x	
1	Group project	90	90		x
1	Seminar	4	4		x
			150		

Estimated 48 hours of self work and 102 hours of team work

Methodology

Introductory Statistics

For the BoostEdu review of the course in statistics, the course assignment on descriptive statistics took the form of inquiry-based learning, where students learnt the compilation, analysis, and communication of descriptive statistics. Albeit at an elementary level, the approach can be considered learning by doing, as choosing the topic, dataset, statistics, and forms of communication was put in the hands of the students. As this was a modification of a pre-existing course, instructors used the course's first of four online workshops to start informal discussions about the assignment. Students were also advised to use the course's message board to post general questions and concerns so that they could be addressed openly, allowing others to benefit from the discussion.

Market research

The course on Market research is a project driven course where a key component is a group project, carried out through the duration of the semester, by teams of 4-5

students. The students propose, plan, and implement an investigation into a market they choose through consultation with the instructors. The course is taught through blended learning, students receive lectures online on the research methods they are applying and can draw from those lectures any time as they are archived in the course's LMS. Students typically include surveys as part of their data gathering and can either administer surveys through the Limesurvey instance offered by Bifröst University or use other online services.

Design

Introductory Statistics

To teach the basics of descriptive statistics, the course's first assignment was changed from the closed ended and textbook based format described above. In the revised form, the assignment revolved around creating an infographic, based on datasets that each group had to find and choose for themselves. Students were encouraged to select a topic that sparked their interest, something that they could relate to and felt worth introducing to others (in this case, fellow classmates, and teachers). The course instructors, being aware that a "treasures hunt" for a good data set can take a long time, initiated a forum with several options, open data sets that could be chosen for analysis. Students were also presented with examples of infographics from online sources, to seek inspiration and to clarify the assignment's instructions. Furthermore, students were offered PowerPoint templates that could be used as a starting point for their design.

Market research

Once a group's research proposal has been reviewed and accepted, students start by working with available secondary data, and then follow up with their primary data collection, both through interviews and sample surveys. The course's textbook provides a methodological overview of a wide range of research settings. Through online lectures, students get an overview of the methods of inferential statistics, and hands-on examples of how to prepare raw survey data for statistical analysis and communication. The course also covers the limitation of online surveys, the pitfalls that come with using convenience sampling, and the importance of selecting representative samples for a given market research project.

In order to support students in communicating their findings and conclusions, two online resources were highlighted as supplementary material. The first, is the website www.data-to-viz.com, which offers users a decision tree to help them find the appropriate data visualization for a given collection of variables. Under each proposed visualization, the website also offers a brief description, a list of common mistakes to avoid, and code examples for those that would like to do more involved

work than the traditional Excel charts. A second resources to support effective data communication was a paper, and the accompanying video presentation, titled Declutter and Focus, which is offered as an OER from Northwestern University. These tools were used to get the students to ideate and explore different possibilities when they designed their data communication materials. The data was analyzed, and findings are presented, both in a written report and with a presentation to a forum of students and teachers.

Experience/Results/Lessons learned

Introductory Statistics

Students of the statistics course were notably more active and engaged with the topic after the redesign. As they were encouraged to share their work with their fellow students, the courses discussion threads became more active, and by browsing through shared infographics, students could see a wide range of ideas and choices for data visualization.

The forum of existing data sets was used by some teams that had a hard time finding appropriate material. Other groups, that did not use data that was explicitly

Market research

One main challenge with having teams work on such a long and involved project, is to keep the work rate steady and continuous. In the course on Market research, we have done that by holding occasional status meetings and by including interim deadlines for certain milestones of the projects. This has been useful in making sure some teams do not sway too far away from the intended depth and style of the research project.

Feedback from students/teachers

Introductory Statistics

What students conveyed to instructors was that they appreciated the chance to be a little bit creative, within a subject that generally emphasizes procedures and formulas. Some students thought it was a little unclear what was being asked of them, not as straightforward as when they are asked to f.ex. calculate some probabilities. And furthermore, some felt the work was too time consuming, considering the assignment's weight in the final grade for the course. Sharing their work openly on the discussion boards created a stronger feeling of community among the students.

Market research

For this course, instructors have suggested topics or sectors for all groups to focus on in their market research, but then given the groups freedom to select the topics or theories to test, within the given sector. This means that there are recurrent themes visible when the final outcomes of the research projects are presented.

Some students have commented that they would have liked more autonomy in their choice of a research subject, and that may well be warranted and worth experimenting with in future versions of the course.

Students have also noted that certain sub-tasks of their research had been underestimated during the planning stage and were much too time-consuming. This is a lesson learnt for both instructors and students and is part of what we discuss with the students in a reflective dialogue that takes place when the final results are presented to the forum. Having people work in teams of 4-5 individuals for the duration of a whole semester also presents the challenge of free-riding and other frictions that come with teamwork. Students are asked to be mindful of these challenges, and during the middle of the semester, they are also required to answer a short survey on how the teamwork is going, in order to try and react to problems such as free-riding early on.

Challenges

Introductory Statistics

Students taking the course in Introductory Statistics have little formal training in data visualization, so it is important to start by producing simpler diagrams, and to offer support f.ex. through discussion boards, for those that want to work on more involved designs.

Market research

There are pros and cons allowing students to rely on convenience sampling of data for the course's core project. Adhering to all the requirements of a proper, statistically representative data collection is difficult and time consuming. So, in order to keep the momentum going and save time, students are allowed to use convenience sampling (through f.ex. social media) in their data collection. The dangers and pitfalls of such methods are discussed, and students encouraged to be mindful of those when inferring findings. One possibility is to find available open data sets that might offer better quality in this respect. But then students forego the training that comes with planning and implementing their own data collection.

Conclusions

For the statistics course, one lesson learnt is to give the students enough freedom to pick and choose the subject or topic that they would like to work on. Before the course review, data sets and topics were chosen by the instructors. But when students are given space to explore and come up with new subject matters to work on, the diversity increases drastically and this gives a lot of value to the course.

In market research, the lessons are similar. It is important to allow students' room to shape and refine the research questions, so that they land on a topic that they can engage with. But to ensure that they are still working within the scope of the course and fulfilling the required learning outcomes, regular dialogue and meetings with instructors are important.