

BoostEdu Case study

Case: Applied Mathematics for Business students

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Abstract/Introduction

The goal is to give the learners and teachers a reasonably flexible and diverse paths through the course curriculum, a way to use interactive tools for provide the students with possibility to choose what they think is best for their learning with the guidance from teachers. Students were given the assignment: **“Teacherless” math, is it feasible**; how can you find help, guidance, solutions etc. not from the course material, nor the textbook, but from other sources.

Motivation and Goals

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.

There is abundant material for mathematics available on-line, both free and not, interactive, and not. Much of that material has reference to a particular textbook, authors, or publishers. Some of it looks like a catalogue of everything related to math, some have a reference to a (national) specific curriculum, that may not be appropriate for our line of study.

This case study focuses on teaching Applied Mathematics at bachelor level in the Faculty 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. Those include 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.

Applied Mathematics Course Description

The course provides a foundation for continuing studies in finance and economics. The basics of linear and nonlinear functions and methods for solving them are covered. Financial mathematics, percentages, and interest rates along with future and present value calculations. Methods of differentiation for maximization and minimization with and without side conditions are reviewed, as well as issues solved by methods of integration.

At the end of the course, the student should be able to:

- Find solutions of linear and non-linear functions and equations

- Solved financial issues regarding percentage and interest calculation and discounting.
- Able to solve optimization problems with or without side conditions.
- Can use mathematics to solve economic problems.

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

The course is taught in the fall semester, for a duration of 6 weeks. The number of students has ranged from around 70 to 120 in recent years. During the semester, students work on weekly assignments that they hand in in pairs.

Methodology

The BoostEdu Strategic Partnership has offered a chance to gather and share knowledge of teaching methods and to reflect on prior course structures.

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The work will be based on BU yearlong practice of distance learning and with “flipped classroom”.

The goal is to give the learners and teachers a reasonably flexible and diverse paths through the course curriculum, a way to use interactive tools for provide the students with possibility to choose what they think is best for their learning with the guidance from teachers.

Key assumption: Students do focus on the applied part of course curriculum and material but will also respond to the demands made by mandatory exercises.

Key question: How to design activities to take further the concept of a digital university from the students’ perspectives, being flexible enough without being too general

Elements of the design

- Students as co-creators:
 - learning by explaining (to the peers) as they work on their assignments in pairs.

- exploring on their own material, webs, apps and other information to help them or guide in solving real life cases related to the scope of the course, Applied Mathematics
- Design of online learning activities
- Online learning communities and support

Outputs/products:

- Students report on the **Assignment: “Teacherless” math, is it feasible?**

Assignment: “Teacherless” math, is it feasible

Students were given the assignment, how can you find help, guidance, solutions etc. not from the course material, nor the textbook.

The instructions were as follows:

Assignment: “Teacherless” math, is it feasible

In the textbook, there are many references to the practical application of the mathematics we are dealing with, hence Applied Mathematics.

The task now is for you to choose some of the practical issues, real-life examples and go on a journey of looking for content outside of the content of the course (as presented in the LMS Canvas) or the textbook.

The idea is that you find, without the intervention of the teacher, ways to learn and explain the subjects you choose.

If you choose to take some practical mathematical subjects that are not necessarily covered in the textbook, that is of course acceptable.

Search and view at least 3 different paths, evaluate how accessible the material is, how it is more (or less) useful to you than the textbook or video-lectures, or other video guidance from the teacher.

Tell me how you managed to learn about a subject using the material you found.

What I want you to do is record and explain

- What is the subject
- Why did you find the topic you chose interesting?
- how do you rate what you found, was it useful, clearer, or more likely to benefit you

Your submission can be in written form, video or other form of your choice or a combination of various things.

I don't want to interfere too much with your choice, this is your task, but I will of course help if you ask me.

Note that the scope of this project is larger than the other weekly projects and work on it should take that into account. This addition takes away what would otherwise have gone into the final project and therefore reduces its weight.

We will discuss this project at our next Tuesday Teams meeting.

This project is related to a project I am working on with colleagues from around Europe.

Then I'm waiting for your name to appear in the list of participants, let me know if it's ok, I won't publish anything without your permission.

Lessons learned/conclusion

Students (62 of them) in the course Applied Mathematics, fall of 2022, handed in 37 reports for the assignment described earlier, most of them worked in pairs as assigned. The reports were in the form of videos, PowerPoint presentations and on the standard reports formatted in Word.

The content of the reports gave new insight into the thinking of students who started working with mathematics on real life subjects.

The students were a little surprised when they got this “open-ended” assignment, an assignment they had to “design” on their own, but as the teacher gave them guidance on how they might approach the subject, they soon felt comfortable tackling the task. This was in the form of Teams meetings as all the students are distance learning students.

The results will be used as supplementary guide for students in the course Applied Mathematics, fall of 2023.

To the teachers' surprise, some of them added things like “I turned to my dad for help” or “Talked to a friend”. Those were rated “acceptable” as it showed the innovation of the students.