

Business Mathematics Reform: A Project-Based Multimedia Approach

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Abstract

The Department of computing and mathematical sciences at Texas A&M University-Corpus Christi is engaged in a reform program to address mathematical concepts in core courses that serve business majors. These mathematical concepts address a variety of real life applications and needs of the business curriculum. Business Mathematics has been one of the most controversial courses on my campus. Traditionally, it covers finance mathematics and brief calculus. In this paper I share my experience in using the University of Arizona MBD (Mathematics for Business Decisions) project-based multimedia approach as a replacement to the traditional business mathematics course. MBD features four interdisciplinary, multimedia projects for lower division students in business and public administration. The two semesters sequence includes probability, simulation, calculus, and optimization. I will demonstrate the new materials, discuss the challenges and rewards of teaching the program, and share the experience of introducing two core courses to the university core curriculum program.

Business Mathematics Reform: A Project-Based Multimedia Approach

Most courses for teaching mathematics for business are based on topics in finance mathematics and brief concepts in calculus, [1], [2]. Students are normally presented with a list of mathematical formulas that govern finance mathematics and a list of rules of differential and integral calculus. Also, students are given specific instruction on how and when to use special rules and formulas. Frequently, drilling questions are assigned, so that the students are given the freedom to participate in the learning process. A cookbook (e.g. schaums series), [3], [4], on how to use these rules and formulas, is made available at book stores to help students succeed in the course. Such books are useful, but they will not help the students gain a deep understanding of the concepts taught, see the real value of the idea presented, and have ownership in the learning process. MBD emerged as a replacement to the traditional Business mathematics

Mathematics for Business Decisions

There are four components of the mathematics for business decisions project: e-text, students note books, dynamic web page, and team data support. These components are used in conjunction with technology support and resources on campus. Firstly, the e-text is consisted of two CD's. The first CD is titled *Probability and Simulation* and the second CD is titled *Calculus and Optimization*. Each CD consists of Microsoft PowerPoint files supplemented by Microsoft Excel worksheets, streaming video clips, and internet links. Secondly, each student's notebook contains all the slides of the Microsoft PowerPoint files in the CD associated with it. Thirdly, MBD is supported by a dynamic friendly user updated national web page, [5]. This web page displays all the information needed about the project including video clips, what others say about MBD, MBD on University of Arizona, updates, etc. Fourthly, team data support is a crucial part of the project. Team work is one of the pillars of MBD. Actual data sets are provided to each team for each of

the four projects. This part of the approach is important because unless the student can apply the new knowledge, the effort to learn will have been only marginally effective.

The program features four interdisciplinary, multimedia projects for lower division students in business and public administration: *Loan Work Outs*, *Stock Option Pricing*, *Marketing Computer Drives*, and *Bidding on an Oil Lease*. The two semesters sequence, including probability, simulation, calculus, and optimization, is designed to replace the traditional combination of finance mathematics and brief calculus. We will demonstrate the new material, discuss the challenges and rewards of teaching the program, and share first hand experience on our campus.

Mathematics for Business Decisions on Texas A&M University-Corpus Christi Campus

Two years ago, two faculty members (a mathematician and an economist) attended an MAA Workshop on Mathematics for Business Decisions. This workshop initiated a joint effort between the college of Science and Technology and the college of Business to do something about the business mathematics course offered by the department of computing and mathematical sciences. Each college formed a committee to assess the situation and look into the pros and cons of the MBD project and its impact on our campus. I have been given the task, as a college representative on the university core curriculum committee, to make a proposal for creating two new math core courses based on the MBD project and to be taken by business students. During spring 2005, two math core courses (MATH 1324-Business Mathematics, MATH 1325-Business Calculus) were approved by the University Core Curriculum Committee effective fall 2006.

During fall 2005, I ran a pilot class of MATH 1325 using the format presented in MBD 2 of the University of Arizona project. The instruction took place in a lab setting where each student has access to a computer that has Microsoft Office and is connected to the World Wide Web. Each student has the choice between the pilot class and the traditional business mathematics class. Those who made the choice to be part of this pilot class were made aware of the task ahead of them. A lot of emphasis was put on the e-text, team work, and use of the class web page.

Support and Instruction

Development of syllabus, use of high-tech material, and conducting new teaching methods were the major challenges in teaching the pilot class of MATH 1325. Much of our success is the result of the special environment of community of learners, strong support received from all levels of the university administration, and computer technology available on our campus.

The class is consisted of two big projects "*Marketing Computer Drives*" and "*Bidding on an Oil Lease*". These projects highlight the mathematical and computer tools needed for business decisions to be taken by students in their future work and subsequent careers. Data for a class version of each project is studied by all students, while at the same time; teams of students are also assigned their own analogous data sets. Immediately after the introduction of a project, each student team gives a preliminary report on its data. All mathematical concepts and tools were introduced using technology through the project on a need basis. Individual and team homework were assigned in connection with the flow of class material within the project. After homework assignments have been completed

and necessary mathematical and computer tools studied, the teams present final reports in both written and oral forms. To balance the teamwork, both midterm and final examinations are taken by students individually. As seen from the titles, student projects are based on significant and current mathematics.

Feed Back, Assessment, Future Prospective

I am keeping a close contact with the team who developed the MBD project at the University of Arizona (UA). In early November 2005, I visited the UA to meet the authors of the MBD project and discuss with them my personal and my student's midterm feed back and comments. My students feed back focused on the following: "difficulty in getting used to an e-text", "an excel prep class is needed", "no help available outside classroom", "enjoyed the real-life applications", "the CD step by step approach is enjoyable", "student's progress report is needed, projects should be the main focus". My main concerns are as follow: "quantity and quality of mathematical concepts taught", "making a balance between lecturing and use of technology", "time allocation for instruction, groups follow up, and assessment". I started with 28 students and ended with 17 students finishing up the course. The grade distribution was as follows:

Grade	A	B	C	D	F	W
Count	7	8	2	0	0	11
%	25	28.57	7.14	0	0	39.29

During summer 2005, I taught a business mathematics class the traditional way and the grade distribution was as follows:

Grade	A	B	C	D	F	W
Count	7	11	15	6	2	4
%	15.56	24.44	33.33	13.33	4.44	8.89

My future expectations are as follow: high students performance and retention, team teaching with faculty from school of business, recognition from community business leaders, more collaboration between mathematics faculty and business faculty, systemic changes in the statistics program and upper division courses in the college of business, and more discussion on importance of working in teams followed by training sessions on teamwork across camps.

Conclusions

Though our experience with this business mathematics reform is still young, it is a win-win situation for both the mathematics program and college of business. Preliminary results show that there is a great potential for students high performance and students retention. In order to get the full benefit of this program, students need to take a computer application in business class (BCIS 1305) before taking the MBD sequence. It is expected that the MBD program positive influence will impact much larger group of future business leaders. The full implementation of MBD in the fall 2006 will provide students with a unique blend of quantitative concepts, computer skills, mathematical tools and ideas, and business concepts.

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