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Designing A Transformational Financial Modeling Course

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Abstract

Both employers and accrediting agencies view workplace readiness as essential in preparing students for their careers. This article discusses a financial modeling course which drastically enhances students' critical thinking and problem-solving abilities, communication skills, and teamwork. This is accomplished through a unique mix of in-class presentations by students utilizing industry data to illustrate topics, constructive peer criticism, and competitive company projects. As evidenced by the hiring of several graduates immediately after graduation by the companies they worked with throughout the course, the course provides students with the necessary skills to succeed. Importantly, while the course setup is innovative, it is not unique and can easily be replicated/designed in other disciplines and universities.

Keywords: financial modeling, transformative, critical thinking, communication skills

1. Introduction

In recent years, experiential and transformational learning has become more important, both to AACSB and to individual institutions across the country. At the same time, employers have lamented the deterioration of students' critical thinking abilities and communication skills (both oral and written). Studies indicate that employers desire graduates possessing strong writing, computing, and quantitative analysis skills (Holtzman and Kraft [2010]) and propose methods for preparing students for this workplace (McDonald et al. [2022]). In addition, a study by Bentley University in 2014 recommends improved student marketability through early exposures to training in soft skills like communication and critical thinking, experiential learning that reflects the workplace, and partnerships between businesses and schools to provide real-world experiences.

In 2019, Dan Pontefact, CEO of the Ponteferact Group, told AACSB and current business school leaders that what we teach needs to align with workforce needs. In this interview, he specifically mentions that once students are working, they are entering a *pit of action* and need to be ready to face the demands of their job. In order to accomplish this, students needs to be allowed and able to creatively and critically think. In addition, the recently revised AACSB standards themselves specifically mention the promotion of a "lifelong learning mindset in learners, including creativity, intellectual curiosity, and critical and analytical thinking" (AACSB International, 2020, p. 43). Furthermore, AACSB has added both *societal impact* and *agility* to its principles, where societal impact includes "addressing real-world problems" (p. 63), and agility includes an adjustment of the curriculum in response to employer feedback and best practices (p. 18).

This article discusses the structure of a financial modeling course at a regional southern university that seeks to improve students' excel skills, but also their critical thinking and communication skills through close collaboration with industry firms and by involving students first-hand in the teaching experience. The following discussion will provide insight into the structure of this course. The financial modeling course distinguishes itself from other courses via the following features, as it targets the most qualified students:

1) *Application Process:* It has an application process for students to identified the students that would benefit the most from the course
2) *Bloomberg Market Concepts:* It has a Bloomberg component, where students have to complete the Bloomberg Market Concepts very early in the semester

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3) *In-Class Presentations:* The course has a presentation component, where students present the course material to each other. In addition, the course involves both a critique, where students have to comment on other students' presentations.
4) *Company Projects:* Each student in the course works with two companies in teams of two. In turn, these teams compete with each other in a presentation to the companies' C-level executives.

Each of these components are now discussed in turn. The article concludes with a summary and implications for future finance education.

2. THE APPLICATION PROCESS

The financial modeling course is typically offered in the fall semester as a "permission of instructor" course. Therefore, applications are available and encouraged around March of each year. The course is a cross-listed graduate/undergraduate course, and invitations to apply by email are sent to all finance majors and MBA students to apply via email. Notably, the course is always scheduled on Friday mornings to minimize overlaps with other class times.

Other than basic identifiers, the application form only asks for current employment (to assess whether students will be able to balance the course with the demands of their jobs), and the two highest-level finance courses completed to date. There are no prerequisites to financial modeling, since practical experience can sometimes compensate for theoretical knowledge, especially in a highly applied course. Students should also indicate any course or professional experience related to excel.

Students are given about a month to apply for the course. Typically, there are around fifteen to twenty applicants. Once all applications have been received, interviews are scheduled. Interviews only last around 20 minutes, but are designed to assess the ability to handle the high workload required by the course, the time management skills of students, the level of seriousness students attach to their studies, and the ability to think critically. The interview begins with the basic questions of how students think financial modeling will help them in their career and what sets them apart to be selected for the course. For example, students are asked how they budget their time between classes, when they start a project relative to its due date, and how many classes they expect to take concurrently with financial modeling. To indicate to students that they need to prepare ahead of time for this course, they are asked to describe their learning process and how they prepare ahead of a typical class. To assess critical thinking ability, applicants are asked to describe a situation where they research a question or problem and came up with a solution entirely on their own. They are also asked to describe a situation where they didn't have all the information to complete a class project and where they would go to search for that information.

On a side note, the last question during the face-to-face interview asks applicants to indicate their knowledge of excel on a level of 1-10. Typical answers are 7-8. I ask that question again during the last class meeting for those students selected to be in the course. Usually, the answer then is 5-6, as students have realized how vast excel is and how much they did not know.

It is unusual for students not to receive an interview. However, only ten or eleven students are selected for the course. The financial modeling course takes place in the trading room at our university, which has limited capacity and two Bloomberg terminals. Students are informed by email that they have been selected for the course and must accept or reject the offer within a week by email. The option to opt-out has never been utilized in eight years of teaching the course, but it is provided in case students realize based on the interview that they would rather not participate in the course.

3. BLOOMBERG MARKET CONCEPTS

As will become clear below, for their in-class presentations, students have to utilize the Bloomberg terminal to obtain data. Consequently, once accepted into the course, students are encouraged to complete the Bloomberg Market Concepts (BMC) over the summer. While our trading room restricts student access during non-class periods, our library also features six Bloomberg terminals. According to Bloomberg, "the BMC is a self-paced e-learning course that provides an interactive introduction to the financial markets. BMC consists of 3 sections — Core Concepts (includes four modules – Economic Indicators, Currencies, Fixed Income, Equities), Getting Started on the Terminal and Portfolio Management. The sections are woven together from Bloomberg data, news, analytics and television. The course is available through the Bloomberg Terminal at BCER <GO> or through the Bloomberg for Education website. **Using the BMC digital courseware as a course companion frees up class time for more advanced topics**." (Bloomberg, 2022)

The added highlights in the last sentence illustrate why students are asked to complete the BMC over the summer; the course hits the ground running in the fall semester, and students are expected at that point to be sufficiently familiar with Bloomberg to use it to obtain data for their projects.

4. IN-CLASS PRESENTATIONS

In the early summer, students are provided with their in-class presentation schedule. For purposes of teaching financial modeling, Simon Benninga's *Financial Modeling, 4th Ed.* Is utilized. During a typical semester, students have four regular in-class presentations, plus a personal presentation (discussed below). For the regular presentations, students should utilize data from the Bloomberg terminal to aide them in becoming more proficient in utilizing the terminal. The personal presentation can utilize data from any source. Students also have to complete one critique during the semester.

Exhibit 1 illustrates the schedule for a typical semester. Each row represents a class meeting day. Topics 1 and 2 are the main topics to be presented. Topic 3 is either a critique or a personal presentation. In each cell, right below the topic, the students are identified by number. For example, topic 1 on September 4 would be presented by students 2 and 8. The legend to identify the actual students would be at the bottom of the schedule, but has been omitted here.

To illustrate how the schedule would work for an individual student, let's focus on Student 2. Let's assume this student's name is Nicole. As the exhibit shows, Nicole has regular presentations on September 4, September 25, October 30, and November 13. She also has a personal presentation on November 20 and a critique due on October 2.

Exhibit 1. Schedule of In-Class Presentations

Date	Topic 1	Topic 2	Topic 3
9/04	Excel Functions and Array Functions (Ch. 33 and 34) (**2**, 8)	Data Tables and Excel Hints (Ch. 31 and 35) (4, 10)	
9/11	Pivot Tables (1, 11)	User-Defined Functions with VBA and Macros and User Interaction (Ch. 36 and 38) (5, 7)	Critique (3, 6)
9/18	Charts and Graphs in Excel (6, 9)	Inserting audio and video files into a spreadsheet and web queries (3, 11)	Critique (5, 8)
9/25	Basic Financial Calculations (Ch. 1) (1, 5)	Matrices (Ch. 32) and Objects and Add-Ins (Ch. 39) (**2**, 10)	Critique (11) Personal (4)
10/02	Corporate Valuation Overview & Valuation Based on the Consolidated Statement of Cash Flows (Ch. 2, 4) (8, 9)	Calculating the WACC (Ch. 3) (3, 7)	Critique (1, **2**)
10/09	Pro Forma Financial Statement Modeling (Ch. 5) (4, 5)	Building a Pro Forma Model (Ch. 6) (6, 10)	Duration and Bond Immunization (Ch. 20,21) (1, 9)
10/16	Catch-up class – Strategize and work on industry project in free time		
10/23	Portfolio Model Introduction (Ch. 8) (3, 4)	Calculating Efficient Portfolios (Ch. 9) (6, 8)	Critique (7) Personal (5) Personal (9)
10/30	Conducting an Event Study (Ch. 14) (10, 11)	Introduction to Options (Ch. 15) (**2**, 7)	Critique (4) Personal (1)
11/06	The Black-Scholes Model (Ch. 17) (1, 8)	Generating and Using Random Numbers (Ch. 24) (3, 5)	Personal (11) Personal (6)
11/13	Introduction to Monte Carlo Methods (Ch. 25) (6, 7)	Simulating Stock Prices (Ch. 26) (**2**, 11)	Critique (9, 10) Personal (10)

11/20	Monte Carlo Simulation for Investments and Value at Risk (Ch. 27, 28) (4, 9)	Personal (3) Personal (8)	Personal (7) Personal (**2**)
12/04	Class Wrap-up and Extra Projects (If Needed) – Prepare for presentation to company representatives		

For the regular presentations, the schedule shows that Nicole would be working with student 8 on her presentation for excel and array functions, with student 10 for matrices and objects and add-ins, with student 7 for introduction to options, and with student 11 for simulating stock prices. It is deliberate that students work with a different partner on each project, since it exposes students to different working styles and also provides them with the opportunity to benefit the most from other students' knowledge. While it has been my experience that students are generally not fans of group work in other courses, they very much appreciate this aspect of the course, since all the students in the course were individually selected based on their capability and everyone pulls their weight. This setup also forces students to work together with others and sets them up for success in the workplace, where it is entirely possible that they will have to work with multiple partners on different projects.

Note that the structure of the in-class projects forces students to become intimately familiar with the material. It is not the professor that is teaching the material but the students, using data from Bloomberg to illustrate the topic. Thus, Nicole may pull stock prices or bond prices to illustrate the usefulness of different excel functions, and she may pull option prices for her introduction to option presentation. The professor is there but simply provides correction/feedback. It is therefore essential that students truly understand the material they are presenting. Following the presentations, the professor provides written feedback in the form of an email, indicating aspects of the presentation that worked well, aspects that could be improved, and other items to take into consideration for their next presentation. A part of the grade takes into consideration the amount of improvement students show in their presentations throughout the semester.

The personal presentation is designed to be a "more fun" presentation of the students' choice. The project encourages students to use any data to illustrate a topic of their choice in excel. The possibilities here are literally only the students' imaginations. In the past, students have done analyses of optimal stock picks, of optimal allocations of Christmas presents to relatives, of forecasting revenues and expenses a move to New York for job purposes would entail, or a fantasy football forecast. The point of this project is to make students realize that they can utilize excel for a variety of purposes in their personal and professional lives.

Lastly, students have to present a critique of other students' presentations. The critiques also involve another student. So, for example, for her critique on October 2, Nicole had to work with student 1 on her critique. The critique is for the presentations on that day. One requirement for the presentations is that students have to send the complete excel files to the entire class by the Wednesday or the presentation week. Thus, Nicole would have access to the presentation for October 2 by September 30, allowing her sufficient time to prepare the critique. This aspect of the presentations is to familiarize students with deadline expectations in their future jobs. Nicole and student 1 now have the option of structuring the critique in various ways. For example, they could both discuss both presentations, they could each discuss one presentation, or they could each focus on different aspects of the presentations. The specific structure of the critique is entirely up to them. However, each critique has to contain the following elements: 1) It has to identify aspects of the project that were done well; 2) It has to identify aspects of the project that can be improved; and 3) It has to discuss different data sources that can be used to illustrate the same subject matter.

Students are encouraged to be critical in their critique and to provide constructive criticism. Students are often uncomfortable being critical of their peers, and the critique is designed to overcome this inhibition. Soon into the semester, students realize that everyone wants to do a good job, and they become more comfortable providing an honest opinion. Once again, this is a skill that will be very useful in their current and future professional lives.

In summary, the in-class presentations are primarily and foremost designed to make students intimately familiar and proficient with excel. However, it is equally important that they improve students' oral communications skills and enhance their critical thinking abilities by utilizing data of their choice to present a complex topic to their peers and professor. The critique takes this one step further by requiring students to think critically about the work done by their peers. At the end of a given semester, students present effortlessly to their peers, and they become exceedingly confident at doing so throughout the semester. This is even more developed in the students' company projects, which are discussed next.

5. COMPANY PROJECTS

The ultimate experience for students in the course is the company presentations. As explained above, in a typical semester each student works with two companies throughout the semester, and each company has two teams of students assigned to it. However, in the early stages of the course, each company only had one student team assigned to it. The competitive aspect of introducing two teams per company added incredible value and quality to the ultimate presentations.

Exhibit 2 shows company assignments for a given semester. In this semester, the fall semester of 2018, we worked with six companies: Dixon, Hughes, Goodman; Florida Blue; Harbor View Advisors; Heritage Capital; Sawgrass Asset Management; and The Energy Authority. This list changes every year, and over the years, other companies have inquired whether they could provide a project. Examples of other companies that have provided projects in the past are Deutsche Bank, Wells Fargo, APR Energy, CIT, Firehouse Subs, TIAA Bank, and others. As shown in the third column of Exhibit 2, the liaison is typically someone that has connections to our university and is either an alum of the university in general or has been a financial modeling student in a prior year, as shown in the legend below the exhibit (names have been omitted from the exhibit). Companies absolutely love being involved in these projects and view it as an opportunity to not only provide students with skills in their part of industry but also to identify high-quality students who may be interested in working for them in the future.

Every project is different, but company assignments are typically made early in the semester, based in part on student preferences. A meeting with the company liaison will typically occur in late September. During this meeting, the liaison will discuss the project and outline their expectations. In all cases, the semester concludes with a final presentation in the company offices, which is usually attended by high-level executives. If the liaison is an analyst or middle manager, this also provides them with the opportunity to highlight their involvement in the project to their superiors. Project grades are assigned by the liaisons in conjunction with the professor, but there has not been any disagreement in the past. It is important that companies declare a winner, and I have interestingly found that this is one of the most important aspects of the company projects for the students. They are all highly competitive and as such want to come out on top.

Exhibit 2. Company Assignments

Company	Meeting Time	Liaison	Teams
Dixon, Hughes, Goodman	Friday, 11/30, 9:30a-12:00p	(1) (2)	1) Students **1**, 2 2) Students 3, 4
Florida Blue	Tuesday, 11/27, 2-4p	(3)	1) Students 5, 6 2) Students 7, 4
Harbor View Advisors	Friday, 11/30, 2-4p	(4) (5)	1) Students 8, 6 2) Students **1**, 3
Heritage Capital	Thursday, 11/29, 9-11a	(6)	1) Students 9, 10 2) Students 8, 11
Sawgrass Asset Management	Wednesday, 11/28, 10-11:30a	(7)	1) Students 5, 10 2) Students 2, 11
The Energy Authority	Tuesday, 11/27, 10:15a-12p	(8) (9)	1) Students 9, 7

(1) Forensic and Valuation Consultant, Modeling (2017) alum
(2) Senior Consultant – Forensic, Litigation Support and Valuation Services, and Modeling (2015) alum
(3) Principal
(4) VP
(5) Analyst, Modeling (2017) alum
(6) Director of Investment Banking Services, alum
(7) Equity Analyst, alum
(8) Senior Structure and Pricing Analyst, alum
(9) Structure and Pricing Analyst, Modeling (2016) alumna

The projects the companies provide are proprietary. However, in this particular semester, the projects had the following themes:

Dixon, Hughes, Goodman: The company provides litigation and valuation services. The project focused on a sanitized case the company has dealt with in the past. One group represented the defense side, the other the litigant.

Florida Blue: The project focused on the valuation of a specific company that had been in the press as being significantly undervalued. Students had to conduct a full cash flow analysis.

Harbor View Advisors: A potential target needed to be valued, complete with an industry and competitive analysis.

Heritage Capital: A hypothetical company was valued using free cash flow analysis. A lot of emphasis in this project was on the excel dashboard that resulted from the valuation.

Sawgrass Asset Management: Students needed to design an ETF based on specific criteria, some of which were provided, and some of which were identified by students. The process started with the stock in the S&P 500 index. Ultimately, the portfolios were stress-tested to identify the better portfolio.

The Energy Authority: Students had to compare and contrast different ways of trading energy based on the TEA's current strategic position.

As you can see, the projects provide a good mix of topical coverage. However, there is definitely a focus on valuation and free cash flow analysis, which is utilized extensively by analysts. Throughout the semester, students meet various times with the companies to report on their progress, culminating in the final presentations indicated in the second column of Exhibit 2.

Once again, let's focus on a particular student in Exhibit 2: Student 1 in the fourth column of Exhibit 2. Let's say this student's name is Chris. As you can see, Chris was assigned to Dixon, Hughes, Goodman (DHG) and to Harbor View Advisors that semester. For his project with DHG, Chris had to work with student 2; for his project with Harbor View, he had to work with student 3. Once again, the assignment of different teammates increase students' ability to work with different styles. For DHG, they had to present on November 30; for Harbor View, they had to present on that same day, in the afternoon. While it may not be optimal to have multiple presentations on the same day, it is realistic to familiarize students with the concept of multiple simultaneous deadlines.

It is, of course, possible to structure the presentations differently. In the semester for Exhibit 1, students did not compete in groups and worked only for one company. The presentations were all scheduled on a specific date and took place at the university. The advantage of this approach is that other students, faculty, and even administrators can be invited to observe the presentations. In the case of this particular course, we even invited the local press to observe. In turn, this motivated other companies to inquire about the course and express their interest to participate. In subsequent years, the company presentations took place at the company locations, as it was increasingly difficult to schedule all companies on the same date.

Measuring the benefit students get out of these projects is difficult but cannot be understated. Not only do they become increasingly confident when they see that the information they learn in school is actually used, they also have now created contacts that will benefit them potentially throughout their entire career. They are able to observe first hand how companies utilize data in their daily decision making and are becoming a part of the process. Having alumni involved in the process helps, as they understand where the students are coming from and what skills they are potentially lacking. Over the years, several students have been hired straight out of the class. In one case, the company hired the entire team. This only makes sense, as the company has had a first-hand look at these students' abilities to perform the work they would ultimately be hired for. Moreover, they have already provided part of the training needed for the job, and the students were at least peripherally able to observe the corporate culture.

6. CONCLUSION

It is difficult to summarize the benefits such a course provides students with. First and foremost, there is the ability to think critically, to analyze information in such a way that a student not only understands it but can communicate it to others. On top of that is new information developed by the student through the arrangement of data that provides them with a particular viewpoint and conclusion, which is then communicated to others. In addition, this conclusion can be compared to the conclusion and data arrangement drawn by a different team working with the same baseline.

A secondary benefit is the ability of students to effectively communicate orally. By the end of each fall semester, all students in the class can communicate and present effortlessly not only to their peers, but also to those above them. This is an invaluable skill in any corporate culture, especially as it relates to complex and technical subject matter.

Yet another benefit of this course is that it provides students with an opportunity to work with multiple other course participants on various projects. The ability to effectively work in teams and overcome obstacles of groupwork is a skill that will increase their marketability by yet another notch. Furthermore, this ability (and requirement) to work with different people on each project also provides each student with the unique opportunity to understand how likeminded individuals approach problems and find solutions. As such, it provides students with more skillsets and arrows in their quivers once they begin working.

Lastly, of course, while navigating all of the above, it cannot be stressed enough that students become experts in the use of Excel in a wide variety of topics and data sources. At the end of the course, they can easily manipulate spreadsheets. I have heard students tell me that interviewers ask them specific questions about Excel functionality when they hear about this course, and they can easily tell them how to code or formulate something in Excel on the spot.

The idea for this course started with a simple email to alumni now working in finance asking them what they did not get out of their studies at our university. The responses mirror those mentioned at the beginning of this article and lamented by employers in general: ability to use Excel, communication skills, and critical thinking skills. I believe this course improves all three of these skills drastically and prepares students for the *pit of action* described by Dan Pontefract.

While this article discusses a very specific course, anyone can design a course that will involve companies working with students and provide students with projects to work on. Good students seek out these opportunities when they are presented to them, and employers are generally eager to become involved, especially if the company liaisons are alumni. Such a course is an easy way to involve our employers more directly and to provide students with the skills necessary in the workplace, which is the ultimate goal of our profession.

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