**Instructor’s Resource Manual**

**Data Analytics for Accounting**

**1st Edition**

Vernon J. Richardson

Ryan A. Teeter

Katie L. Terrell

**TABLE OF CONTENTS**

To the Instructor 3

Assignment Schedules Including all Chapters 6

Presentation Suggestions 7

Chapter

1. Data Analytics in Accounting and Business……………………………………………………….7
2. Data Preparation and Cleaning……………………………………………………………….........9
3. Modeling and Evaluation: Going from Defining Business Problems and Data Understanding to Analyzing Data and Answering Questions……………………………………………………….11
4. Visualizations: Using Visualizations and Summaries to Share Results with Stakeholders………13
5. The Modern Audit and Continuous Auditing………………………………………………….…15
6. Audit Data Analytics…………………………………………………………………………….. 17
7. Generating Key Performance Indicators………………………………………………………… 19
8. Financial Statement Analytics……………………………………………………………………21

Lab Introduction…………………………………………………………………………..…..23

Requesting Remote Desktop Accounts ……………………………...…………...24

UARK Remote Desktop Frequenty Asked Questions…………………………....26

Short Guide to Connecting to the Remote Desktop at UARK………………....28

Labs…………………………………………………………………...………… 31

DAA1e Software Academic Licenses and Downloads…………………………...33

1. Chapter 1 Labs………………………………………………………………………………………35
2. Chapter 2 Labs………………………………………………………………………………………36
3. Chapter 3 Labs………………………………………………………………………………………39
4. Chapter 4 Labs………………………………………………………………………………………40
5. Chapter 5 Labs………………………………………………………………………………………41
6. Chapter 6 Labs………………………………………………………………………………………41
7. Chapter 7 Labs………………………………………………………………………………………43
8. Chapter 8 Labs………………………………………………………………………………………43

**TO THE INSTRUCTOR**

This guide includes suggested assignment schedules, topical outlines, chapter comments and observations, and suggested team exercises based on the authors experience teaching data analytics.

**Assignment Suggestions.** This textbook is not designed to be a survey of data analytics in accounting. Instead, it is intended to develop student skills to support accountant’s roles as data analysts. Consequently, we recommend that the assignments include the problems and labs that will develop these skills and require critical thinking. Different instructors will teach this course differently, some choosing to only use the labs or only include the text. Others hoping to cover this textbook in eight weeks, instead of a full fifteen-week period. The assignment suggestions assume that this material will be covered over fifteen-week period.

**Brief Topical Outlines.** These outlines are designed to assist instructors in coordinating classroom discussions with material covered in the textbook and the PowerPoints. The Brief Topical Outlines identify topics that we believe are important enough to merit some classroom discussion. The outlines also include references to illustrations in the textbook, PowerPoints, questions, problems, and cases that may serve as useful supplements to your class presentations.

**Comments and Observations.** You will probably find that our comments and observations suggest coverage of more topics than your time will allow. This is because our comments are drawn from the experiences of three instructors over many semesters. Therefore, we suggest that you borrow from our comments that which appeals to you and discard that which does not.

**Course Description and Objectives.**

For information only, we use the following course description and objectives:

# Course Description

Data Analytics is changing the business world - data simply surrounds us! With so much data available about each of us (i.e., how we shop, what we read, what we’ve bought, what music we listen to, where we travel, who we trust, etc.), arguably, there is the potential for analyzing that data in a way that can answer fundamental business and accounting questions and create value.

According to the results of 18th Annual Global CEO Survey conducted by PwC, many CEOs put a high value on Data Analytics, and 80% of them place data mining and analysis as the second-most important strategic technology for CEOs. In fact, per PwC’s 6th Annual Digital IQ survey of more than 1,400 leaders from digital businesses, the area of investment that tops CEOs’ list of priorities is business analytics.[[1]](#footnote-1)

This textbook addresses what we believe will be a similar impact of data analytics on accounting and auditing. For example, we argue that data analytics will play an increasingly critical role in the future of audit. In a recent Forbes Insights/KPMG report “Audit 2020: A Focus on Change”, the vast majority of survey respondents believe both that:

1. auditors must better embrace technology and
2. technology will enhance the quality, transparency and accuracy of the audit.

No longer will auditors be simply checking for errors, misstated accounts, fraud, and risk in the financial statements, or merely report their findings at the end of the audit. Through the use of data analytics, audit professionals will be collecting and analyzing the company’s data similar to the way a business analyst would to help management make better business decisions. In our textbook, we emphasize audit data analytics and all the testing that can be done to perform audit testing.

Data analytics also potentially has an impact on financial reporting. With the use of so many estimates and valuations in Financial Accounting, some believe that employing Data Analytics may substantially improve the quality of the estimates and valuations. Likewise, the use of XBRL data gives accountants access to more timely and more extensive accounting data for financial analysis.

This textbook recognizes that accountants don’t need to become data scientists – they may never need to build a data repository or do the real hardcore data analytics or machine learning – however, we do emphasize seven skills that we believe analytic-minded accountants should have, including the following:

1. Developing an Analytics Mindset - recognize when and how data analytics can address business questions
2. Data Scrubbing and Data Preparation – comprehend the process needed to clean and prepare the data before analysis
3. Data Quality – recognize what is meant by data quality, be it completeness, reliability or validity
4. Descriptive Data Analysis – perform basic analysis to understand the quality of the underlying data and its ability to address the business question
5. Data Analysis through Data Manipulation – demonstrate ability to sort, rearrange, merge and reconfigure data in a manner that allows enhanced analysis.
6. Defining and Addressing Problems through Statistical Data Analysis – identify and implement an approach that will use statistical data analysis to draw conclusions and make recommendations on a timely basis
7. Data Visualization and Data Reporting – report results of analysis in an accessible way to each varied decision maker and their specific needs

Consistent with these skills we desire in all accountants, we recognize that Data Analytics is a process. The process begins by identifying business questions that can be addressed with data, and then test the data, refine our testing and finally, communicate those findings to management. We describe our data analytics process by using an established data analytics model called the IMPACT Cycle, by Isson and Harriott:

1. Identify the Question
2. Master the Data
3. Perform Test Plan
4. Address and Refine Results
5. Communicate Insights
6. Track Outcomes

Course Objectives

After completing this course, students should be able to:

1. Describe in detail the purpose of data analytics and how it can create value for accountants.
2. Describe the IMPACT model and how it can be used to address most accounting issues that can be addressed by accountants.
3. Demonstrate proficiency in multiple software tools to manage data, perform test analyses, communicate findings through text, tables and visualizations.
4. Explain how data analytics can be used in accounting, auditing, managerial accounting and financial accounting to find patterns, errors, and anomalies and find insights useful to decision making.
5. Describe and demonstrate different types of test approaches that can be used to gather insights in decision making.

**Note to Instructors who plan on Using Comprehensive Labs with Dillard’s data:**

The use of Dillard’s data requires gaining access to the data housed at the University of Arkansas.  For your students to gain access, you will need to follow the procedures outlined below.  Please allow up to one week for full access.

For instructors, we recommend that you request student accounts in advance to your first lab using the Comprehensive Case which uses Dillard’s data. One you have a remote access account, you can log in to access the University of Arkansas server using one of the following systems: Windows 10 App, Windows, or Mac. Guidelines for logging in with each of these systems can be found below:

[Requesting Remote Desktop Accounts](file:///\\IL02FIL001\HOME$\allie_kukla\Documents\Richardson%20DAA%201e\OLC\IRC\Dillard's%20Data%20Directions\Updated%207.26\Requesting%20UARK%20Remote%20Desktop%20Accounts.docx)

[Logging into UARK Remote Desktop – Window 10 App](file:///\\IL02FIL001\HOME$\allie_kukla\Documents\Richardson%20DAA%201e\OLC\IRC\Dillard's%20Data%20Directions\Updated%207.26\Logging%20into%20UARK%20Remote%20Desktop%20-%20Windows%2010%20App.docx)

[Logging into UARK Remote Desktop – Mac](file:///\\IL02FIL001\HOME$\allie_kukla\Documents\Richardson%20DAA%201e\OLC\IRC\Dillard's%20Data%20Directions\Updated%207.26\Logging%20into%20UARK%20Remote%20Desktop%20-%20Mac.docx)

[Logging into UARK Remote Desktop – Windows Legacy](file:///\\IL02FIL001\HOME$\allie_kukla\Documents\Richardson%20DAA%201e\OLC\IRC\Dillard's%20Data%20Directions\Updated%207.26\Logging%20into%20UARK%20Remote%20Desktop%20-%20Windows%20Legacy.docx)

Still have Questions? [UARK Remote Desktop FAQ](file:///\\IL02FIL001\HOME$\allie_kukla\Documents\Richardson%20DAA%201e\OLC\IRC\Dillard's%20Data%20Directions\Updated%207.26\UARK%20Remote%20Desktop%20FAQ.docx)

Vernon J. Richardson

Ryan A. Teeter

Katie L. Terrell

**ASSIGNMENT SCHEDULE INCLUDING ALL CHAPTERS—Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Chapter** | **Topic** | **Written Assignment** | **Objective Questions** |
| 1 | Data Analytics in Accounting and Business | Questions 1-8, 1-13, Problems 1-1, 1-2, 1-3, 1-4 | MC 1-1 to 1-10 |
| 1 | Labs (if time permits) | Lab 1-1 and 1-3 |  |
| 2 | Data Preparation and Cleaning | Problem 2-1, 2-3, 2-4, 2-5 | MC 2-1 to 2-10 |
| 2 | Labs (if time permits) | Lab 2-2 and 2-4 |  |
| 3 | Modeling and Evaluation: Going from Defining Business Problems and Data Understanding to Analyzing Data and Answering Questions | Problem 3-1, 3-3, 3-5. 3-6 | MC 3-1 to 3-22 |
| 3 | Labs (if time permits) | Lab 3-3 and 3-4 |  |
| 4 | Visualizations: Using Visualizations and Summaries to Share Results with Stakeholders | Problem 4-2, 4-3, 4-8 and 4-9 | MC 4-1 to 4-15 |
| 4 | Labs (if time permits) | Lab 4-2 and 4-3 |  |
| 5 | The Modern Audit and Continuous Auditing | Problem 5-4 and 5-5 | MC 5-1 to 5-10 |
| 5 | Labs (if time permits) | Lab 5-3 and 5-4 |  |
| 6 | Audit Data Analytics | Problem 6-3, 6-5, and 6-7 | MC 6-1 to 6-10 |
| 6 | Labs (if time permits) | Lab 6-3 and 6-4 |  |
| 7 | Generating Key Performance Indicators | Problem 7-1, 7-5 and 7-7 | MC 7-1 to 7-10 |
| 7 | Labs (if time permits) | Lab 7-2 and 7-3 |  |
| 8 | Financial Statement Analytics | Problem 8-1, 8-3, 8-5 | MC 8-1 to 8-10 |
| 8 | Labs (if time permits) | Lab 8-1 and 8-2 |  |

### PRESENTATION SUGGESTIONS

**CHAPTER 1**

**Data Analytics in Accounting and Business**

**Brief Topical Outline**

A. Introduction

1. What is Data Analytics? (PowerPoints 1-5 – 1-8)

2. How does Data Analtyics Affect Business? (PowerPoints 1-9 – 1-11)

3. How does Data Analytics Affect Auditing? (PowerPoints 1-12, 1-13)

4. How does Data Analytics Affect Financial Reporting? (PowerPoint 1-14)

5. How does Data Analytics Affect Taxes? (PowerPoint 1-15)

B. Introduction to the IMPACT Model (PowerPoint 1-16 – 1-18)

1. Identify the Questions (PowerPoint 1-19)

2. Master the Data (PowerPoint 1-20)

3. Perform the Test Plan (PowerPoint 1-21)

4. Address and Refine Results (PowerPoint 1-22)

5. Communicate Insights (PowerPoint 1-23)

6. Track Outcomes (PowerPoint 1-24)

C. Data Analytics Skills Needed by Accountants (PowerPoints 1-26 – 1-29)

D. Hands-on Example of the IMPACT Model (PowerPoints 1-30)

1. Identify the Questions (PowerPoint 1-31)

2. Master the Data (PowerPoints 1-32, 33, 34)

3. Perform the Test Plan (PowerPoints 1-35 – 1-38)

4. Address and Refine Results (PowerPoints 1-39, 40)

5. Communicate Insights (PowerPoint 1-41)

6. Track Outcomes (PowerPoint 1-42)

E. Summary – (PowerPoint 1-44)

**Comments and Observations**

In our first class meeting, we discuss not only about the role of accountants as information provider, but also how that role is steadily changing to become an interpreter of data. That is, to actively look to data and the interpretation of that data to help answer business problems by decide what questions need answering, what information needs to be collected, build or ensure that the information system is collecting it, analyze the collected information to meet its intended purpose.

We then start defining data analytics and how it creates value in business and then more specifically what data analytics has done and has the potential of doing in auditing, managerial accounting, financial reporting and taxes.

We then introduce the IMPACT model. The IMPACT model serves as a foundation for this chapter, and for each remaining chapter. We also use it as a foundation for each of the labs throughout the text. We discuss each of these steps, one by one and talk about what each step entails and why it is important.

We spend some time naming the skills needed by accountants and what we will do in the textbook to help get them there.

We wrap up the chapter by illustrating the IMPACT model with the real-world Lending Club data. We go through each step of the IMPACT model one by one, asking what types of questions Lending Club would likely want answered and focus in on the loan decision of whether to extend a loan or not. The discussion continues by asking what data could be used to answer these questions if we could get any data we wanted, etc. I then jump into the data with them to show them what is there. We talk about data cleaning, data transformation and what assumptions we would need to make to do that. We also do some pivot tables analysis and answer the question of why loans were rejected and inversely why loans are accepted.

While I haven’t done it yet, I wondered how the class discussion would change if we started with illustrating the IMPACT model and the Lending Club data. There are always pros and cons of using a flipped classroom model, but it is something that you might consider.

One of the goals of chapter 1 is for the students to open their minds and really learn what data analytics can do for accountants. I believe this chapter provides a good introduction and foundation for what will be included in the textbook and start to address the skills needed.

**Suggested Team Exercise**

Just as the discussion of the questions that could be answered with data analytics, I have them think of auditing data and think what auditing issues/questions auditors have with sales and how that could they could be addressed with say, the complete sales journal. I think it is helpful for the students to meet in little groups and see if they can address that topic and then report their findings ready for a full class discussion.

**CHAPTER 2**

Data Preparation and Cleaning

**Brief Topical Outline**

1. Introduction (Powerpoint 2-2)
2. Master the Data (PowerPoint 2-4)
3. The Use of Relational Databases ((PowerPoints 2-5 and 2-6)
   1. How are Data Stored in Relational Databases (PowerPoints 2-7 – 2-10)
   2. The Use of a Data Dictionary (PowerPoint 2-11)
4. Extract, Transform and Load (PowerPoints 2-13 – 2-14)
   1. Step 1: Determine the purpose and scope of the request (PowerPoint 2-15)
   2. Step 2: Obtain the Data (PowerPoints 2-16 – 2-20)
   3. Step 3: Validate the Data for Completeness (PowerPoint 2-21)
   4. Step 4: Clean the Data (PowerPoint 2-22)
   5. Step 5: Load the Data for Data Analysis (PowerPoint 2-23)
5. Summary (PowerPoint 2-25)

**Comments and Observations**

As we journey through the impact model, after identifying the question, we start looking at the data. So, the discussion might begin by saying, if we had all available data to answer this question, what data would we use. We ask questions like:

1. What data is available to address the key question? Is there a system that already captures that data?
2. What is the quality of the data? Is it reliable? Is it biased? Why does that matter?
3. Where did it come from (internal vs. external sources), etc.? Why does that matter?

I like going through the basics of relational databases again. They won’t admit to remembering it from their AIS course, if they were fortunate to have taken one before this course. This will help them understand how data might come from their datasets and prepare them for some of the labs where joining different tables using the primary and/or foreign keys might be required. I also point out the data dictionary for a dataset like Lending Club or Dillards (particularly if you have already covered these in class in Chapter 1).

It is important to know what data you need, and then being able to ask for that data in a complete way. You certainly don’t want to keep going back to the datasource to ask for additional data. And you probably can’t just ask for all of the data because it is often just too big to use it all! Once you have the data you need to validate that you got what you asked for and assess the data quality and then clean the data and get it ready for its intended use. As noted in Chapter 1, data analysts spend between 50 and 90% of their time cleaning and preparing the data as part of ETL (Extract, Load, and Transfer). The final step is to load the data in some type of analysis program, which often depends on the test approach used, your own familiarity with the software packages and whether you want to use more of an analysis package (such as Excel or SAS or Weka, etc) or a visualization program (such as Tableau).

**Suggested Team Exercise**

Given access to the LendingClub data, I like to start the team exercise by highlight a loan acceptance/rejection decision that a bank must make. And say something like, as a team, “write down all of the data you’d like to know about an individual before deciding whether to extend a loan and if you do extend a loan, the interest rate that you would likely give them”. Allow the team a full 8-15 minutes to put together the data needs. I allow students to then present their findings.

I then take over the class discussion After that, we look at the data dictionary saying what is I download the raw dataset of the loan rejection decisions made by LendingClub. I let them see what data is available and what characteristics they have – are they numeric, are they ranked, are they machine readable, etc.? We then open the dataset of loan rejections – I generally use 2013 as it will fit in Excel and see what issues there are in cleaning the data. For example, how do you do analysis if the loan data says years of work experience “10+” instead of “10”? How do you build that into your analysis? What do you do with missing data? These are all important questions that they will need to start addressing as they become data analysts!

1. “Data Driven: What students need to succeed in a rapidly changing business world,” by PwC, <http://www.pwc.com/us/en/faculty-resource/assets/PwC-Data-driven-paper-Feb2015.pdf>, posted February 2015, extracted January 9, 2016. [↑](#footnote-ref-1)