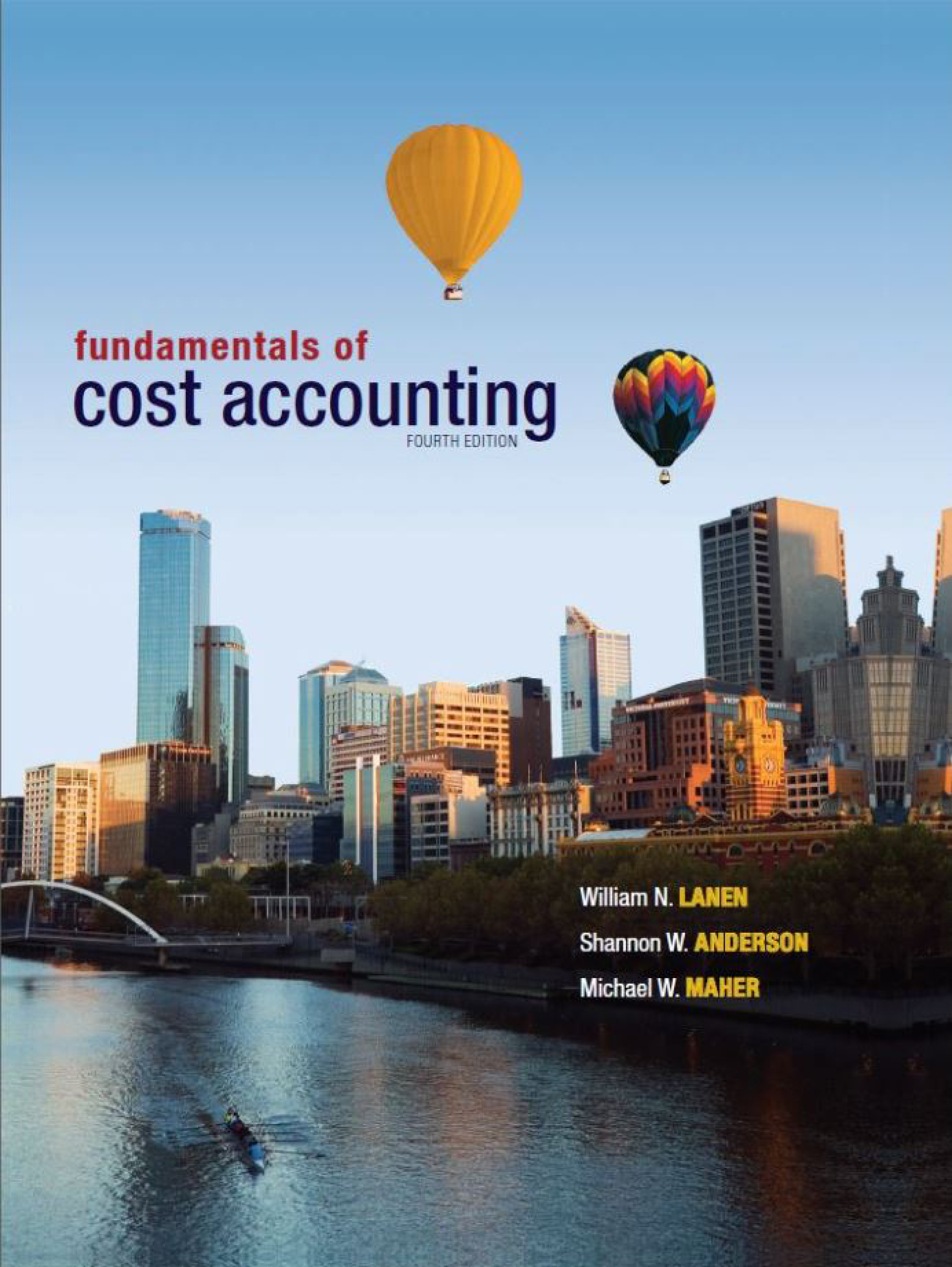


fundamentals of cost accounting

FOURTH EDITION

William N. LANEN

Shannon W. ANDERSON

Michael W. MAHER

McGraw Hill connect® plus+

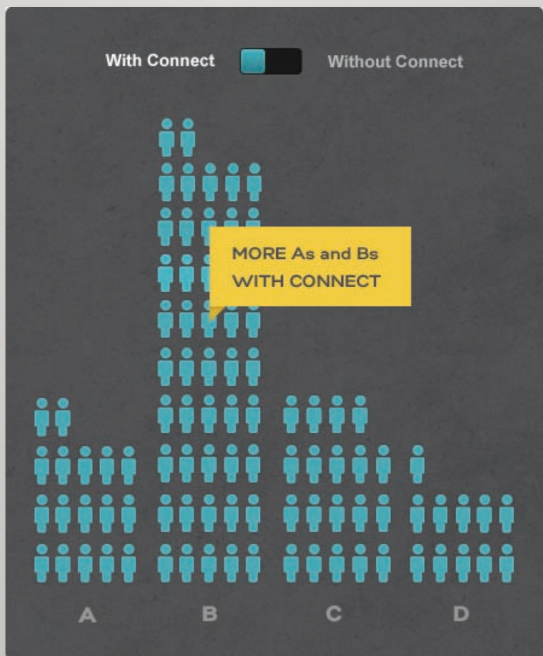
ACCOUNTING

The integrated solutions for Lanen/Anderson/Maher's *Fundamentals of Cost Accounting, 4e* have been proven to help you achieve your course goals of improving student readiness, enhancing student engagement, and increasing their comprehension of content. Known for its clear and engaging style, the Lanen solution employs the use of real-world scenarios, LearnSmart, and instant feedback on practice problems to help students engage with course materials, comprehend the content, and achieve higher outcomes in the course.

Our new **Intelligent Response Technology**-based content offers students an intelligent homework experience that helps them stay focused on learning instead of navigating the technology.

Finally, McGraw-Hill's adaptive learning component, **LearnSmart**, provides assignable modules that help students master core concepts and come to class more prepared. LearnSmart with Lanen is an introductory managerial accounting review, providing students with a refresher on these topics for their cost accounting course.

PROVEN EFFECTIVE



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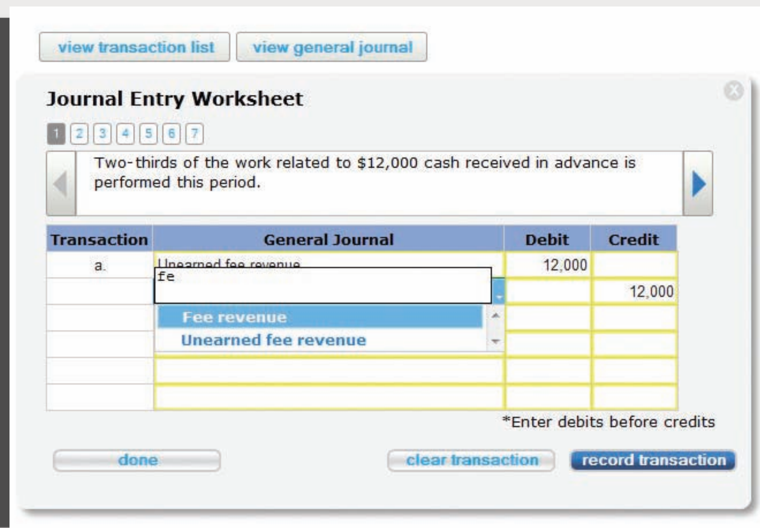
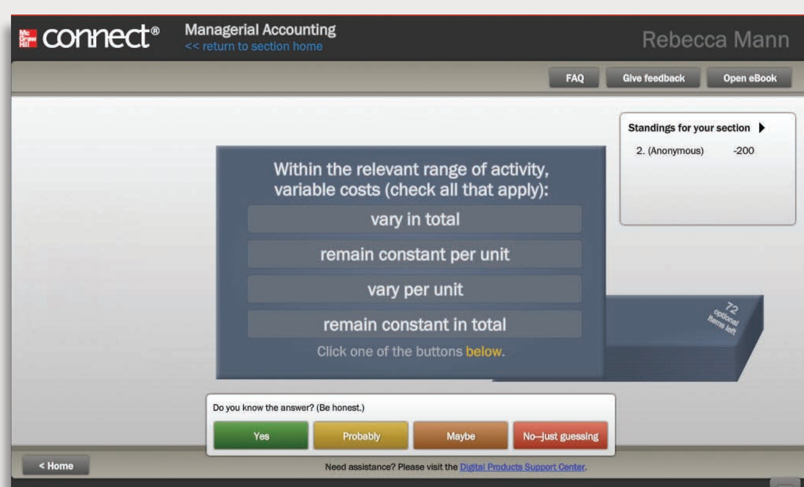
FEATURES

Intelligent Response Technology

Intelligent Response Technology (IRT) is *Connect Accounting's* new student interface for end-of-chapter assessment content. Intelligent Response Technology provides a general journal application that looks and feels more like what you would find in a general ledger software package, improves answer acceptance to reduce student frustration with formatting issues (such as rounding), and, for select questions, provides an expanded table that guides students through the process of solving the problem.



LearnSmart™



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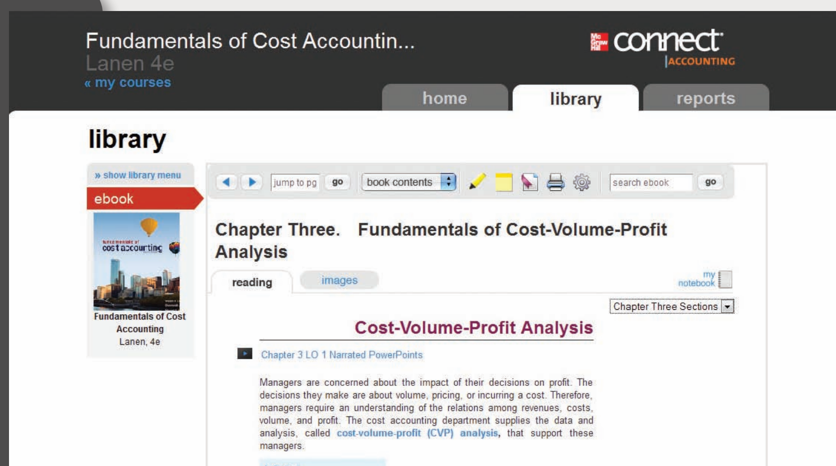
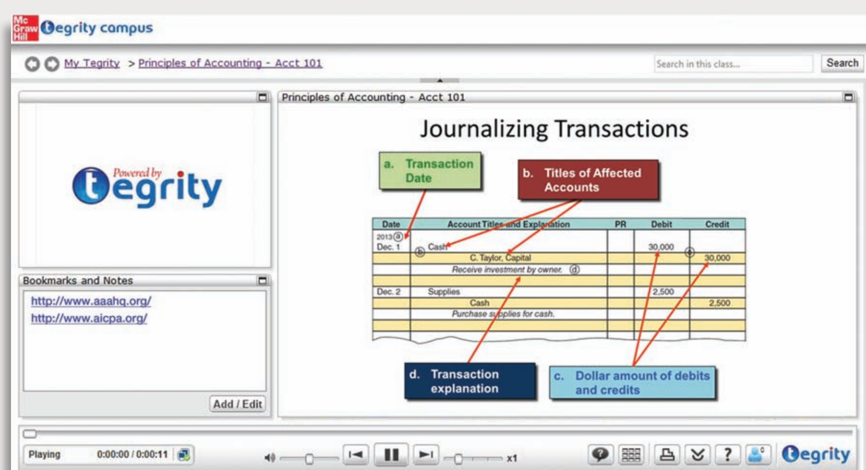


Lecture Capture



Make your classes available anytime, anywhere. With simple, one-click recording, students can search for a word or phrase and be taken to the exact place in your lecture that they need to review.

Fundamentals of Cost Accounting

4e

William N. Lanen
University of Michigan

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University of California at Davis

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McGraw-Hill Irwin

The McGraw-Hill Companies

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Dedication

To my wife, Donna, and my children, Cathy and Tom, for encouragement, support, patience, and general good cheer throughout the years.

Bill

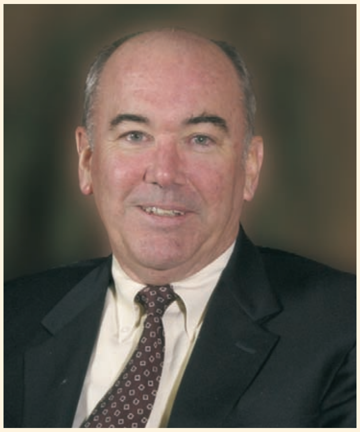
I dedicate this book to my husband Randy, my children Evan and David, and my parents, Max and Nina Weems. Your support and example motivate me to improve. Your love and God's grace assure me that it isn't necessary.

Shannon

I dedicate this book to my wife, Kathleen, my children, Krista and Andrea, my stepchildren, Andrew and Emily, and to my extended family, friends, and colleagues who have provided their support and wisdom over the years.

Michael

About the Authors



William N. Lanen

William Lanen is a professor of accounting at the **University of Michigan**. He previously taught at the **Wharton School** at the **University of Pennsylvania**. He received his AB from the **University of California-Berkeley**, MS from **Purdue University**, and his PhD from the **Wharton School**. He has taught cost accounting to undergraduates, MBA students, and executives, including in global programs in Europe, South America, and Asia. He currently is the director of the Office of Action-Based Learning at the Ross School of the University of Michigan. His research focuses primarily on performance evaluation and rewards.

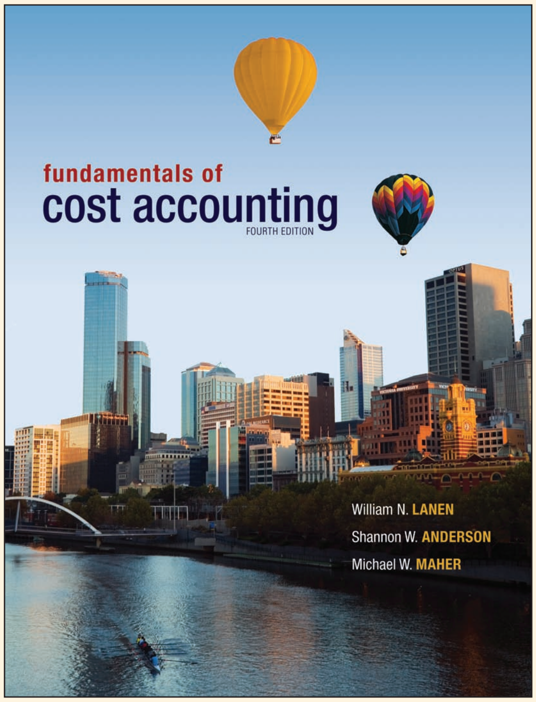
Shannon W. Anderson

Shannon Anderson is a professor of management at the **University of California-Davis** and a Principle Fellow at the **University of Melbourne**. She previously taught at **Rice University** and the **University of Michigan**. She received her PhD from **Harvard University** and a BSE from **Princeton University**. Shannon has taught undergraduates, MBA students, and executive education students in a variety of courses on cost accounting, cost management, and management control. Her research focuses on the design and implementation of performance measurement and cost control systems.

Michael W. Maher

Michael Maher is a professor of management at the **University of California-Davis**. He previously taught at the **University of Michigan** and was a visiting professor at the **University of Chicago**. He received his MBA and PhD from the **University of Washington** and his BBA from **Gonzaga University** and was awarded a CPA by the State of Washington. He has published more than a dozen books, including several textbooks that have appeared in numerous editions. He has taught at all levels from undergraduate to MBA to PhD and executives. His research focuses on cost analysis in service organizations, corporate governance, and white-collar crime.

Providing a Clear View



For a student, taking a cost accounting course can be like finding yourself in tall grass: surrounded by dense concepts and far from the path to mastery. *Fundamentals of Cost Accounting* gives students a clear view by lifting them above the overgrowth. By focusing on the fundamental concepts that students will need and employing a conversational writing style that keeps them engaged throughout the course, *Fundamentals* focuses students on comprehension rather than memorization and provides a context for their learning. The material is presented from both a preparer and a user perspective, allowing instructors to provide both accounting majors and nonmajors with an effective and relevant understanding of cost accounting topics. In this fourth edition, the text continues to provide the following core features:

Readability

Fundamentals of Cost Accounting continues to be praised as one of the most readable texts on the market. Lanen, Anderson, and Maher employ a conversational writing style that students can understand, making concepts and topics more accessible. Throughout the text, exhibits and illustrations provide visuals to further assist students in understanding how complex topics fit together in a logical way.

> *"[Fundamentals of Cost Accounting] is a very readable text with excellent examples and illustrations."*
>
> —Robert Elmore
> *Tennessee Technological University*

Conciseness

Short, readable chapters that focus on core cost accounting concepts give Lanen, Anderson, and Maher a leg up on the competition. While other texts tend to tack on topics and fit concepts into chapters in seemingly arbitrary ways, *Fundamentals of Cost Accounting* presents basic topics in a coherent sequence, helping students to see the integration of the concepts quickly and easily.

Relevance

Each chapter of *Fundamentals of Cost Accounting* opens with **The Decision**—a real dilemma faced by a manager in one of a variety of service and manufacturing companies. These vignettes tie in to the **Business Application** boxes later in the chapter, which highlight related issues reported in the business world and the authors' own experiences with companies where they have worked or conducted research, demonstrating the relevance of cost accounting to the real world. **The Debrief** feature links the topics in the chapter to the decision dilemma faced by the manager in the opening vignette.

"Clear and easy to read."

—Molly Brown
James Madison University

"The text has a good, broad coverage that can be adapted to meet the needs of the cost accounting course."

—Donald Campbell
Brigham Young University–Idaho

"Lanen provides a succinct and readable text for the basics of cost accounting. The emphasis is on the fundamentals."

—Jay Holmen
University of Wisconsin Eau Claire

"Its topical coverage is very good and its layout and readability are also very good."

—David Bukovinksy
Wright State University

"The writing is excellent, accompanied by many useful illustrations."

—Leslie Kren
University of Wisconsin Milwaukee

Step into the Real World

5

Chapter Five

Cost Estimation

LEARNING OBJECTIVES

After reading this chapter, you should be able to:

LO 5-1 Understand the reasons for estimating fixed and variable costs.

LO 5-2 Estimate costs using engineering estimates.

LO 5-3 Estimate costs using account analysis.

LO 5-4 Estimate costs using statistical analysis.

LO 5-5 Interpret the results of regression output.

LO 5-6 Identify potential problems with regression data.

LO 5-7 Evaluate the advantages and disadvantages of alternative cost estimation methods.

The Decision

"I've read several books on cost analysis and worked through decision analysis problems in some of my college classes. Now that I own my own business, I realize that there was one important thing that I always took for granted in doing those problems. We were always given the data. Now I know that doing the analysis once you have the data is the easier part. How are the costs determined? How do I know if they are fixed or variable? I am trying to decide whether to open a new store and I need answers to these questions.

I thought about the importance of being able to determine fixed and variable costs after reading an article about, of all things, the costs of text messaging [see the Business Application *item "The Variable Cost of a Text Message" on the next page]. The article talked about the low variable costs of sending text messages and the implications for pricing services. Although I am in a different industry, the basic principles still apply."*

Charlene Cooper owns Charlene's Computer Care (3C), a network of computer service centers located throughout the South. Charlene is thinking about opening a new center and has asked you to help her make a decision. She especially wants your help estimating the costs to use in the analysis.

Why Estimate Costs?

When managers make decisions, they need to compare the costs (and benefits) among alternative actions. Therefore, managers need to estimate the costs associated with each alternative. We saw in Chapter 4 that good decisions require good information about costs; the better these estimates, the better the decision managers will make. In this chapter, we discuss how to estimate the cost data required for decision making.

Chapter Opening Vignettes

Do your students sometimes wonder how the course connects with their future? Each chapter opens with *The Decision,* a vignette in which a decision maker needs cost accounting information to make a better decision. This sets the stage for the rest of the chapter and encourages students to think of concepts in a business context.

Business Application **The Variable Cost of a Text Message**

Text messaging is a common add-on service to mobile phones, but how profitable is it for the phone companies? In September 2008, the chairman of the Senate Antitrust Committee sent letters to four major telecommunications companies asking for information about prices and costs. His interest was prompted by a price increase from \$.10 to \$.20 for the pay-per-use service.

Although the companies did not discuss the costs of text messaging in their responses, the variable cost can be estimated by the engineering method. First, how does a text message use the carriers' resources?

> A text message initially travels wirelessly from a handset to the closest base-station tower and is then transferred through wired links to the digital pipes of the telephone network, and then, near its destination, is converted back into a wireless signal to traverse the final leg, from tower to handset.

How does sending a text message impact the network?

> In the wired portion of its journey, a file of such infinitesimal size is inconsequential. Srinivasan Keshav, a professor of computer science at the University of Waterloo in Ontario, said, "Messages are small. Even though a

What does this mean for the costs?

> Professor Keshav said that once a carrier invests in the centralized storage equipment—the cost of storing a terabyte now is only \$100 and dropping—and the staff to maintain it, its costs are basically covered. "Operating costs are relatively insensitive to volume," he said. "It doesn't cost the carrier much more to transmit a hundred million messages than a million."

In other words, the variable costs are close to zero. What are the implications for pricing? With no incremental fixed or variable costs associated with the texting product, carriers profit from offering unlimited messaging at an affordable rate.

> Once one understands that a text message travels wirelessly as a stowaway within a control channel, one sees the carriers' pricing plans in an entirely new light. The most profitable plan for the carriers will be the one that collects the most revenue from the customer: unlimited messaging, for which AT&T and Sprint charge \$20 a month and T-Mobile, \$15.

Source: Randall Stross, "What Carriers Aren't Eager to Tell You

Business Application

Do your students need help connecting theory to application? The *Business Application* examples tie in to *The Decision* chapter-opening vignettes and are drawn from contemporary journals and the authors' own experiences. They illustrate how to apply cost accounting methods and tools.

"[The Business Application *features are*] *a very helpful piece to help students see how the course material becomes relevant in the professional world."*

—N. Ahadiat
University of California Pomona

Debrief

Do your students understand how to apply the concepts in each chapter to become better decision makers? All chapters end with a Debrief feature that links the topics in the chapter to the decision problem faced by the manager in the opening vignette.

The Debrief

After considering the cost estimates in Exhibit 5.8, Charlene commented:

> *“This exercise has been very useful for me. First, I learned about different approaches to estimating the cost of a new center. More important, I learned about the advantages and disadvantages of each approach. When I look at the numbers in Exhibit 5.8, I have confidence in my decision to open a new center. Although there is a range in the estimates, all of the estimates are below my expected revenues. This means I am not going to spend more time on reconciling the cost estimates because I know that regardless of which estimate I think is best, my decision will be the same.”*

SUMMARY

Accurate cost estimation is important to most organizations for decision-making purposes. Although no estimation method is completely accurate, some are better than others. The usefulness of a cost estimation method depends highly on the user’s knowledge of the business and the costs being analyzed.

The following summarizes the key ideas tied to the chapter’s learning objectives.

LO 5-1 Understand the reasons for estimating fixed and variable costs. The behavior of costs, not the accounting classification, is the important distinction for decision making. Cost estimation focuses on identifying (estimating) the fixed and variable

“Good illustrations and real-world examples. It has broad and comprehensive topic coverage.”

—Robert Lin
California State University East Bay

All applicable Exercises are included in *Connect Accounting*®

EXERCISES

5-25. Methods of Estimating Costs: Engineering Estimates (LO 5-2)
Custom Homebuilders (CH) designs and constructs high-end homes on large lots owned by customers. CH has developed several formulas, which it uses to quote jobs. These include costs for materials, labor, and other costs. These estimates are also dependent on the region of the country a particular customer lives. Below are the cost estimates for one region in the Midwest:

Administrative costs	$20,000
Building costs – per square foot (basic)	$ 90
Building costs – per square foot (moderate)	$ 150
Building costs – per square foot (luxury)	$ 225
Appliances (basic)	$15,000
Appliances (moderate)	$25,000
Appliances (luxury)	$45,000
Utilities costs (if required)	$40,000

Required
A customer has expressed interest in having CH build a moderate, 3,000 square-foot home on a vacant lot, which does not have utilities. Based on the engineering estimates above, what will such a house cost to build?

5-26. Methods of Estimating Costs: Engineering Estimates (LO 5-2)
Cray-Z Consultants provides management accounting advice to not-for-profit firms. It employs three levels of consultants, based on experience and education: partner, senior, and associate. When Cray-Z considers bidding on jobs, it estimates the costs using a set of stan-

End-of-Chapter Material

Being able to assign end-of-chapter material with confidence is important. The authors have tested the end-of-chapter material over time to ensure quality and consistency with the chapter content.

“This is an excellent cost accounting book with quality end of chapter materials.”

—Judy Daulton
Piedmont Technical College

“Well written; good end-of-chapter material.”

—R. E. Bryson
University of Alabama in Huntsville

Excel

eXcel mhhe.com/lanen4e

Excel is essential to contemporary cost accounting practice, and Lanen 4e integrates Excel where appropriate in the text. Several exercises and problems in each chapter can be solved using the Excel spreadsheet templates found on the text's Online Learning Center or *Connect* Library. An Excel logo appears in the text next to these problems.

Chapter 5 Cost Estimation

5-30. Methods of Estimating Costs: High-Low (LO 5-4)

eXcel mhhe.com/lanen4e

Adriana Corporation manufactures football equipment. In planning for next year, the managers want to understand the relation between activity and overhead costs. Discussions with the plant supervisor suggest that overhead seems to vary with labor-hours, machine-hours, or both. The following data were collected from last year's operations:

Month	Labor-Hours	Machine-Hours	Overhead Costs
1	3,625	6,775	$513,435
2	3,575	7,035	518,960
3	3,400	7,600	549,575
4	3,700	7,265	541,400
5	3,900	7,955	581,145
6	3,775	7,895	572,320
7	3,700	6,950	535,110
8	3,625	6,530	510,470
9	3,550	7,270	532,195
10	3,975	7,725	565,335
11	3,375	6,490	503,775
12	3,550	8,020	564,210

"Strong end of chapter and test bank materials. Strong inclusion of Excel in the chapters"

—Michael Flores,
Wichita State University

Integrative Cases

Cases can generate classroom discussion or be the basis for good team projects. These integrative cases, which rely on cost accounting principles from previous chapters as well as the current chapter, ask students to apply the different techniques they have learned to a realistic situation.

INTEGRATIVE CASE

5-57. Cost Estimation, CVP Analysis, and Decision Making (LO 5-4, 5, 8)

Luke Corporation produces a variety of products, each within their own division. Last year, the managers at Luke developed and began marketing a new chewing gum, Bubbs, to sell in vending machines. The product, which sells for $5.25 per case, has not had the market success that managers expected and the company is considering dropping Bubbs.

The product-line income statement for the past twelve months follows:

Revenue		$14,682,150
Costs		
Manufacturing costs	$14,440,395	
Allocated corporate costs (@5%)	734,108	15,174,503
Product-line margin		$ (492,353)
Allowance for tax (@20%)		98,470
Product-line profit (loss)		$ (393,883)

All products at Luke receive an allocation of corporate overhead costs, which is computed as 5 percent of product revenue. The 5 percent rate is computed based on the most recent year's corporate cost as a percentage of revenue. Data on corporate costs and revenues for the past two years follow:

	Corporate Revenue	Corporate Overhead Costs
Most recent year	$106,750,000	$5,337,500
Previous year	$ 76,200,000	4,221,000

What's New in the Fourth Edition?

Our primary goal in the fourth edition remains the same as in the previous three editions—to offer a cost accounting text that lets the student see the development of cost accounting tools and techniques as a natural response to decision making. We emphasize the intuition behind concepts and work to minimize the need to "memorize." We believe that students who develop this intuition will, first, develop an appreciation of what cost accounting is about and, second, will have an easier time understanding new developments that arise during their careers. Each chapter clearly establishes learning objectives, highlights numerous real-world examples, and identifies where ethical issues arise and how to think about these issues. Each chapter includes at least one integrative case that illustrates the links among the topics.

We present the material from the perspective of both the preparer of information as well as those who will use the information. We do this so that both accounting majors and those students planning other careers will appreciate the issues in preparing and using the information. The opening vignettes tie to one of the *Business Application* features in the chapter to highlight the relevance of cost accounting to today's business problems. All chapters end with a *Debrief* that links the topics in the chapter to the decision problem faced by the manager in the opening vignette.

The fourth edition has been updated to include new discussion on the links between activity-based cost management and **lean manufacturing** and **lean accounting**, as well as new discussion on **strategy** and **performance**.

The end-of-chapter material has increased by almost 10 percent, and much of the material retained from the third edition has been revised. Throughout the revision process, we have retained the clear writing style that is frequently cited as a strength of the text.

1 Cost Accounting: Information for Decision-Making

- Two new review questions.
- Two new critical discussion questions.
- Four new exercises.
- Two new cases.

2 Cost Concepts and Behavior

- New *Business Application* on the costs of e-books vs. paper books.
- Two new review questions.
- Two new critical discussion questions.
- Two new exercises.
- One new case.

3 Fundamentals of Cost-Volume-Profit Analysis

- One new critical discussion question.
- One new exercise.

4 Fundamentals of Cost Analysis for Decision Making

- One new critical discussion question.
- Revised exercises and problems.

5 Cost Estimation

- One new review question.
- One new critical discussion question.
- Two new exercises.
- One new problem.

6 Fundamentals of Product and Service Costing

- One new review question.
- One new critical discussion question.
- Two new exercises.
- One new case.

7 Job Costing

- One new critical discussion question.
- Two new exercises.
- Two new problems.

8 Process Costing

- One new critical discussion question.
- Two new exercises.
- Two new problems.

9 Activity-Based Costing

- One new critical discussion question.
- Two new exercises.
- Two new problems.

10 Fundamentals of Cost Management

- Significantly revised discussion of activity-based cost management including a discussion of the links between activity-based cost management and lean manufacturing and lean accounting.
- One new critical discussion question.
- Three new exercises.
- One new problem.

11 Service Department and Joint Cost Allocation

- One new critical discussion question.
- Three new exercises.
- Two new problems.

12 Fundamentals of Management Control Systems

- Two new critical discussion questions.
- One new problem.

13 Planning and Budgeting

- One new critical discussion question.
- Three new exercises.

14 Business Unit Performance Measurement

- One new critical discussion question.
- Three new problems.

15 Transfer Pricing

- One new critical discussion question.
- Two new exercises.
- One new problem.

16 Fundamentals of Variance Analysis

- One new critical discussion question.
- Revised exercises and problems.

17 Additional Topics in Variance Analysis

- One new critical discussion question.
- One new exercise.
- Two new problems.

18 Performance Measurement to Support Business Strategy

- Added extensive discussion of strategy and performance.
- One new review question.
- One new critical discussion question.
- Two new exercises.

Appendix Capital Investment Decisions: An Overview

- Revised questions, exercises, and problems.

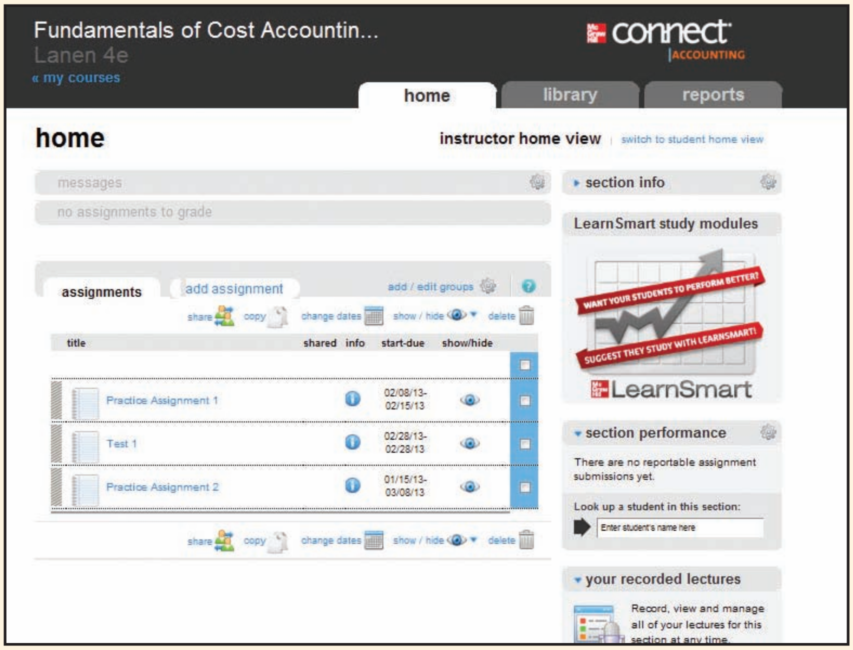
Total Teaching Package for Instructors

McGraw-Hill Connect® Accounting

McGraw-Hill *Connect Accounting* is an online assignment and assessment solution that connects you with the tools and resources necessary to achieve success through faster learning, more efficient studying, and higher retention of knowledge.

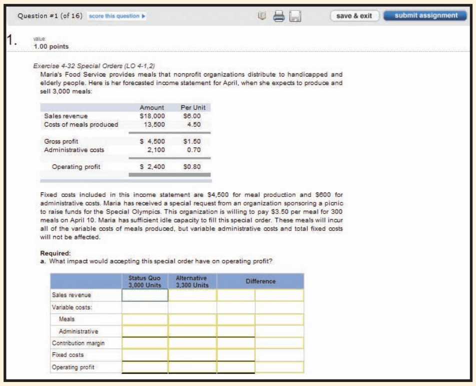
Online Assignments

McGraw-Hill *Connect Accounting* helps students learn more efficiently by providing feedback and practice material when and where they need it. *Connect Accounting* grades homework automatically and students benefit from the immediate feedback that they receive, particularly on any questions they may have missed. Furthermore, algorithmic questions provide students with unlimited opportunities for practice.



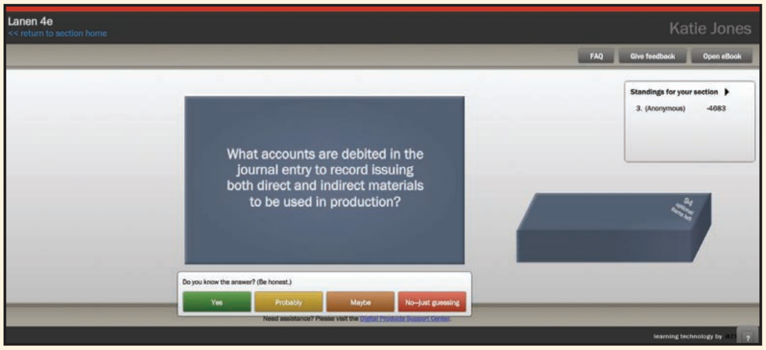
Intelligent Response Technology (IRT)

IRT is a redesigned student interface for our end-of-chapter assessment content. The benefits include improved answer acceptance to reduce students' frustration with formatting issues (such as rounding); and a general journal application that looks and feels more like what you would find in a general ledger software package. Also, select questions have been redesigned to test students' knowledge more fully. They now include tables for students to work through rather than requiring that all calculations be done offline.



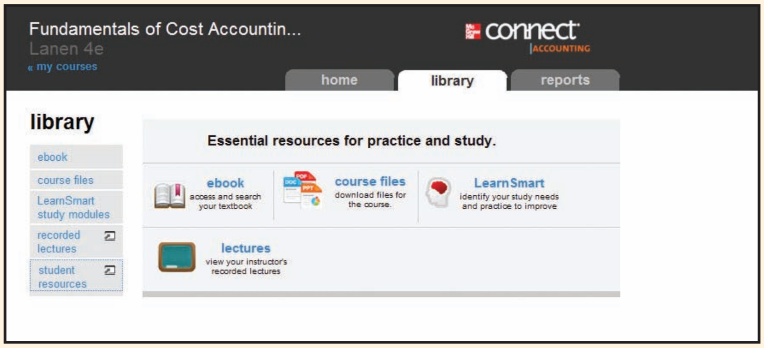
LearnSmart

LearnSmart adaptive self-study technology within *Connect Accounting* ensures your students are learning faster, studying more efficiently, and retaining more knowledge by pinpointing the concepts that the individual student does not understand and mapping out a personalized study plan for his or her success. Based on students' self-diagnoses of their proficiency, LearnSmart intelligently delivers a series of adaptive questions, providing students with a personalized one-on-one tutor experience. LearnSmart can be assigned within *Connect* together with quantitative end-of-chapter material to provide comprehensive and balanced homework for students. Uniquely with Lanen, 4e, LearnSmart provides an introductory managerial accounting review (based on McGraw-Hill's #1 best-selling text) so that students taking the follow-up cost accounting course can get up to speed on the fundamental concepts effectively and efficiently before moving on to the application of those same topics. In doing so, instructors can feel confident assuming a similar level of baseline knowledge across all students.



Student Library

The *Connect Accounting* Student Library gives students access to additional resources—such as recorded lectures, online practice materials, and a searchable, media-rich eBook with which students can highlight and take and share notes—and study assets from the Online Learning Center, all from one convenient location.



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McGraw-Hill *Connect Accounting* offers a number of powerful tools and features to make managing assignments easier so faculty can spend more time teaching.

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- Go paperless with the eBook and online submission and grading of student assignments.
- Have assignments scored automatically, giving students immediate feedback on their work and side-by-side comparisons with correct answers.
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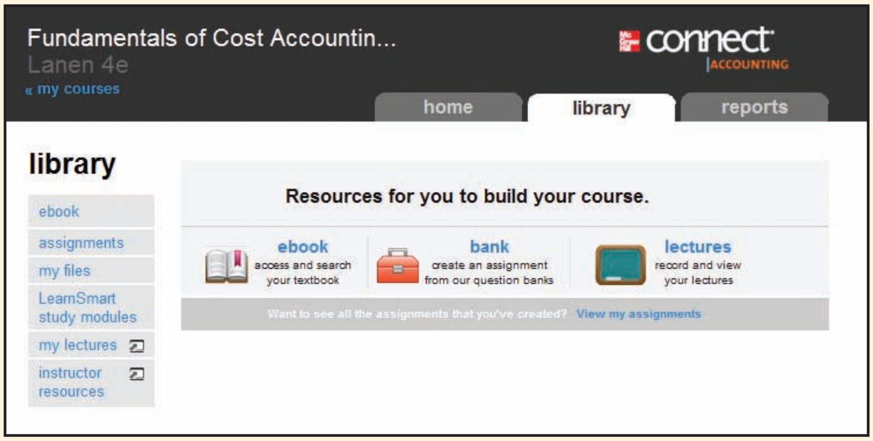

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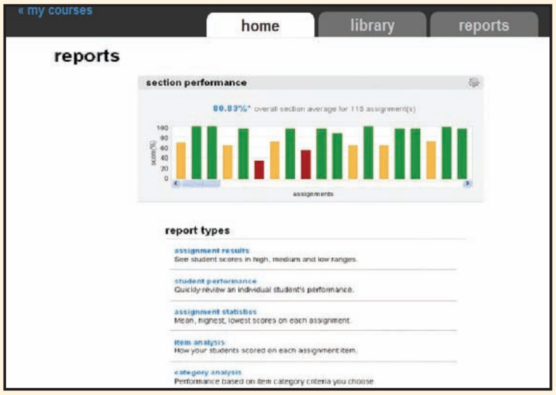

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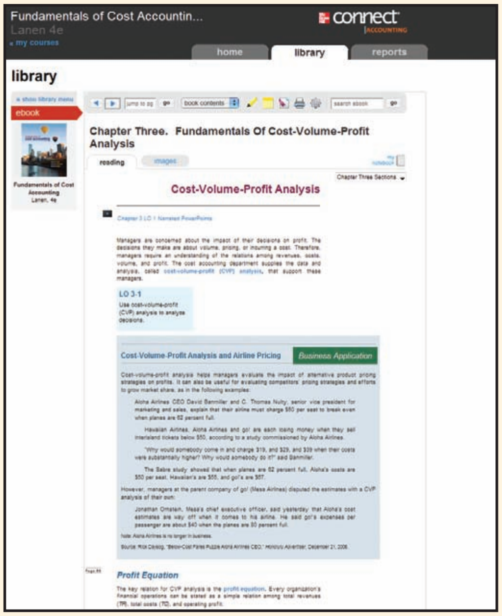

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The McGraw-Hill Companies, Inc., is a proud corporate member of AACSB International. Recognizing the importance and value of AACSB accreditation, we have sought to recognize the curricula guidelines detailed in AACSB standards for business accreditation by connecting selected questions in Lanen 4e, with the general knowledge and skill guidelines found in the AACSB standards. The statements contained in Lanen 4e are provided only as a guide for the users of this text. The AACSB leaves content coverage and assessment clearly within the realm and control of individual schools, the mission of the school, and the faculty. The AACSB does also charge schools with the obligation of doing assessment against their own content and learning goals. While Lanen 4e and its teaching package make no claim of any specific AACSB qualification or evaluation, we have labeled selected questions according to the six general knowledge and skills areas; the labels or tags within Lanen 4e are as indicated. There are, of course, many more within the test bank, the text, and the teaching package that might be used as a "standard" for your course; however, the labeled questions are suggested for your consideration.

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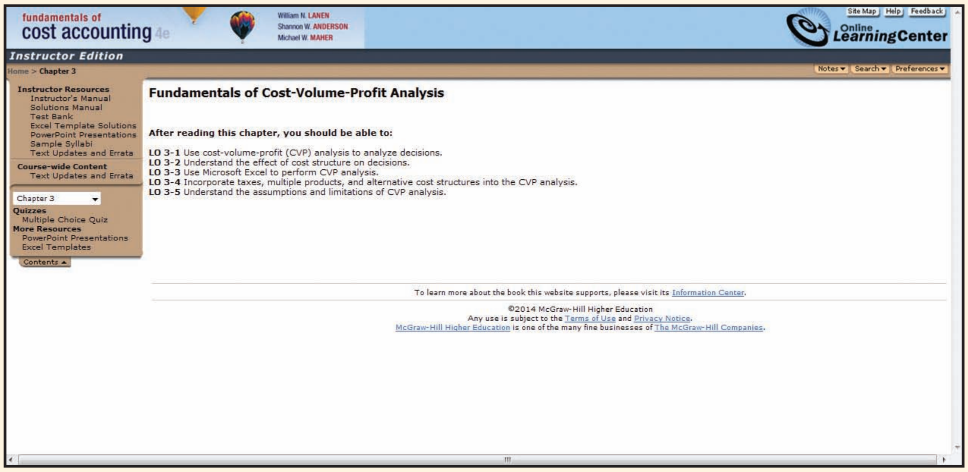
Online Learning Center *(www.mhhe.com/lanen4e)*

The password-protected instructor side of the book's Online Learning Center (OLC) houses all the instructor resources you need to administer your course, including:

- Solutions Manual
- Test Bank

- Instructor's Resource Manual
- Instructor PowerPoint slides
- Excel Template Solutions
- Sample syllabus

If you choose to use *Connect Accounting* with Lanen 4e, you will have access to these same resources via the Instructor Library.



Instructor's Resource Manual

Prepared by David Doyon, Southern New Hampshire University

Each chapter and appendix includes:

- Chapter Learning Objectives
- Chapter Outline
- Comments and observations concerning the chapter content, methods of presentation, and usefulness of specific assignment material
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Available on the password-protected instructor side of the Online Learning Center and the *Connect* Instructor Library.

Solutions Manual

Prepared by William Lanen, University of Michigan

Solutions to all Discussion Questions, Exercises, Problems, Cases, and Comprehensive Problems.

Available on the password-protected Instructor side of the Online Learning Center and the *Connect* Instructor Library.

Excel Spreadsheet Templates

eXcel
mhhe.com/lanen4e

Prepared by Jack Terry

This resource includes solutions to spreadsheet problems found in the text end-of-chapter material.

Available on the password-protected instructor side of the Online Learning Center and the *Connect* Instructor Library.

PowerPoint Presentations

Prepared by Jon Booker and Charles Caldwell, Tennessee Technological University; Cynthia Rooney, University of New Mexico; and Susan Galbreath, Lipscomb University

A complete set of Instructor PowerPoints, following the chapter-by-chapter content.

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Prepared by John Plouffe

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- Narrated PowerPoint Presentations
- Excel templates

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These templates are tied to selected end-of-chapter material and are designated in the text by the Excel icon.

McGraw-Hill's *Connect Accounting*

See page xii for details.

LearnSmart

See page xiii for details.

Quick Reference to Codes and Icons

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Excel templates allow students to practice accounting like real professionals.

These can be accessed from the Online Learning Center at www.mhhe.com/lanen4e or within the *Connect Accounting* Library.

Service icons highlight nonmanufacturing examples.

Writing icons designate end-of-chapter problem material that has a writing component.

Ethics icons illustrate items that ask students to think about the ethical ramifications of a business decision.

Acknowledgments

A special thank you

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Brief Contents

Contents

Fundamentals of Cost Accounting

4e

1

Chapter One

Cost Accounting: Information for Decision Making

LEARNING OBJECTIVES

After reading this chapter, you should be able to:

LO 1-1 Describe the way managers use accounting information to create value in organizations.

LO 1-2 Distinguish between the uses and users of cost accounting and financial accounting information.

LO 1-3 Explain how cost accounting information is used for decision making and performance evaluation in organizations.

LO 1-4 Identify current trends in cost accounting.

LO 1-5 Understand ethical issues faced by accountants and ways to deal with ethical problems that you face in your career.

The Decision

"I opened this store on Main Street shortly after I graduated. This is a tourist town, and I knew that a cookie store would attract people. I've seen it grow a bit over the last few years, but the return has always been small.

I read recently that most small businesses fail within three years. (See the Business Application *item "The Importance of Understanding Costs.") I went back to school last year hoping to learn some business skills that will help me really take control and increase the store's value. One thing I need to do is develop a better understanding of my costs. This semester I'm taking a cost accounting class. I know a little bit about the subject, but I know there is a lot more to learn. I'm curious, though, how this class will help me and how what I will learn will further my career, whether I remain an owner or move into management at a larger organization."*

Carmen Diaz is the founder of Carmen's Cookies, which she opened three years ago. Recently, she returned to school for a business degree. The store has been marginally profitable, but Carmen knows she must make a decision soon. Should she work on making the store more profitable, or should she abandon it and seek employment with another firm?

Carmen, like all managers, wants to add value to her company and is looking for knowledge that will help her do this. Like you, she is now studying cost accounting as one of the disciplines that she will use. Carmen knows that the world is a fast-changing place. She wants to learn not only what is current but also a way to think about problems that she can apply throughout her career. To do this, she knows that she has to develop an intuition about the subject. She cannot just learn a few facts that she is sure to forget soon. After developing this intuition, she will be able to evaluate the value of new cost accounting methods introduced throughout her career.

In this chapter, we give an overview of cost accounting and illustrate a number of the business situations we will study to put the topic in perspective. The examples we use and the description of how they apply to larger organizations (or to not-for-profit organizations or government agencies) are discussed in more detail in individual chapters. The examples also illustrate how the discipline of cost accounting can make a person a more valuable part of any organization.

The Importance of Understanding Costs — *Business Application*

Opening a new business is risky under the best circumstances. In the food business, "Two out of every three new restaurants, delis, and food shops close within three years of opening, according to government statistics, the same failure rate for small businesses in general." Part of the problem is that,

> … restaurant novices make the same costly mistake: vastly underestimating the money it will take just to break even. Linda Lipsky, a restaurant consultant, counsels them to have enough money to cover every aspect of a business for the first six months, including food, salaries, benefits, kitchen equipment, rent, and utilities.

Source: M. Maynard, "Love Food? Think Twice Before Jumping into the Restaurant Business," *The New York Times,* August 27, 2008.

Value Creation in Organizations

Why Start with Value Creation?

We start our discussion with the concepts of value creation and the value chain because in cost accounting our goal is to assist managers in achieving the maximum value for their organizations. Measuring the effects of decisions on the value of the organization is one of the fundamental services of cost accounting. As providers of information (accountants) or as the users of information (managers), we have to understand how the information can and will be used to increase value. We can then come back to questions about how to design accounting systems that accomplish this goal.

LO 1-1
Describe the way managers use accounting information to create value in organizations.

Value Chain

value chain
Set of activities that transforms raw resources into the goods and services that end users purchase and consume.

The **value chain** is the set of activities that transforms raw resources into the goods and services end users (households, for example) purchase and consume. It also includes the treatment or disposal of any waste generated by the end users. As an example, the value chain for gasoline stretches from the search and drilling for oil, through refining the oil into gasoline, to the distribution of gasoline to retail outlets such as convenience stores, and, finally, to the treatment of the emissions produced by automobiles or the waste oil recycled at a service station.

In much of our discussion about cost accounting, we will be concerned with the part of the value chain that comprises the activities of a single organization (a firm, for example). However, an important objective of modern cost accounting is to ensure that the entire value chain is as efficient as possible. It is necessary for the firm to coordinate with vendors and suppliers and with distributors and customers to achieve this objective. In the gasoline example, ExxonMobil must work with suppliers of drilling equipment to ensure the equipment is available when needed. It also needs to work with owners of their On the Run franchises to ensure that gasoline is delivered to the stations as needed.

The cost accounting system provides much of the information necessary for this coordination. Therefore, at times we will also consider where in the value chain it is most efficient to perform an activity.

value-added activities
Those activities that customers perceive as adding utility to the goods or services they purchase.

The **value-added activities** that the firms in the chain perform are those that customers perceive as adding utility to the goods or services they purchase. The value chain comprises activities from research and development through the production process to customer service. Managers evaluate these activities to determine how they contribute to the final product's service, quality, and cost.

Exhibit 1.1 identifies the individual components of the value chain and provides examples of the activities in each component, along with some of the costs associated with these activities. Although the list of value chain components in Exhibit 1.1 suggests a sequential process, many of the components overlap. For example, the R&D and design processes might take place simultaneously. Feedback from

Exhibit 1.1 The Value Chain Components, Example Activities, and Example Costs

Component	Example Activities	Example Costs
• Research and development (R&D)	• The creation and development of ideas related to new products, services, or processes.	• Research personnel • Patent applications • Laboratory facilities
• Design	• The detailed development and engineering of products, services, or processes.	• Design center • Engineering facilities used to develop and test prototypes
• Purchasing	• The acquisition of goods and services needed to produce a good or service.	• Purchasing department personnel • Vendor certification
• Production	• The collection and assembly of resources to produce a product or deliver a service.	• Machines and equipment • Factory personnel
• Marketing and sales	• The process of informing potential customers about the attributes of products or services that leads to their sale.	• Advertising • Focus group travel • Product placement
• Distribution	• The process for delivering products or services to customers.	• Trucks • Fuel • Web site creation, hosting, and maintenance
• Customer service	• The support activities provided to customers for a product or service.	• Call center personnel • Returns processing • Warranty repairs

production workers on existing products might be incorporated in the development of new models of a product. Companies such as Apple solicit "feature requests" from customers for new versions of software.

Most organizations operate under the assumption that each of the value chain components adds value to the product or service. Before product ideas are formulated, no value exists. Once an idea is established, however, value is created. When research and development of the product begins, value increases. As the product reaches the design phase, value continues to increase. Each component adds value to the product or service.

You may have noticed that administrative functions are not included as part of the value chain. They are included instead in every business function of the value chain. For example, human resource management is involved in hiring employees for all business value chain functions. Accounting personnel and other managers use cost information from each business function to evaluate employee and departmental performance. Many administrative areas cover each value chain business function.

Supply Chain and Distribution Chain

Firms buy resources from suppliers (other companies, employees, etc.). These suppliers form the **supply chain** for the firm. Firms also sell their products to distributors and customers. This is the **distribution chain** of the firm. At times in our discussion, we will consider the companies and individuals supplying to or buying from a firm and the effect of the firm's decisions on these suppliers and customers. We can think of these suppliers and customers as being on the firm's *boundaries.* Thus, the supply chain and distribution chain are the parts of the value chain outside the firm.

supply chain
Set of firms and individuals that sells goods and services to the firm.

distribution chain
Set of firms and individuals that buys and distributes goods and services from the firm.

The value chain is important because it creates the value for which the customer is willing to pay. The customer is not particularly concerned with how work is divided among firms producing the product or providing the service. Therefore, one decision firms must make is where in the value chain a value-added component is performed most cost effectively. Suppose, for example, that some inventory is necessary to provide timely delivery to the customer. Managers need accounting systems that will allow them to determine whether the firm or its supplier can hold the inventory at the lower cost.

Focus on the Supply Chain — *Business Application*

Customers are concerned with the total cost of producing a product or service (because of the effect on its price), but are not concerned about which firm in the supply chain incurred the cost. Therefore, companies think about not only reducing their own costs but also reducing costs in the entire chain. The supply chain for cars and trucks includes multiple suppliers of parts and components. Chrysler LLC has set a goal of reducing its supply chain costs by 25 percent over three years. John Campi, executive vice president for procurement, explains that this does not mean that Chrysler will simply pay its suppliers 25 percent less, but, "[I]t means, between us, we have to find ways to improve our supply chain operations."

Source: P. Gupta, "Chrysler Aims to Cut Supply Chain Costs by 25 Percent," *Reuters,* August 15, 2008.

Using Cost Information to Increase Value

Using the value chain as a reference, how can cost information add value to the organization? The answer to this question depends on whether the information provided improves managers' decisions. Suppose a production process is selected based on cost information indicating that the process would be less costly than all other options. Clearly, the information adds value to the process and its products. The measurement and reporting of costs is a valuable activity. Suppose cost information is received too late to help managers make a decision. Such information would not add value.

Accounting and the Value Chain

If you have taken a financial accounting course, you focused, for the most part, on preparing and interpreting financial statements for the firm as a whole. You were probably not concerned with what stage in the value chain produced profits. In cost accounting, as we will see, we need to understand how the individual stages contribute to value and how to work with other managers to improve performance. Although financial accounting and cost accounting are related, there are important differences.

Accounting Systems

LO 1-2
Distinguish between the uses and users of cost accounting and financial accounting information.

All accounting systems are designed to provide information to decision makers. However, it is convenient to classify accounting systems based on the primary user of the information. Investors (or potential investors), creditors, government agencies, tax authorities, and so on are outside the organization. Managers are *inside* the organization. The classification of accounting systems into financial and cost (or managerial) systems captures this distinction between decision makers.

Financial Accounting

financial accounting
Field of accounting that reports financial position and income according to accounting rules.

Financial accounting information is designed for decision makers who are not directly involved in the daily management of the firm. These users of the information are often external to the firm. The information, at least for firms that are publicly traded, is public and typically available on the company's Web site. The managers in the company are keenly interested in the information contained in the financial accounting reports generated. However, the information is not sufficient for making operational decisions.

Individuals making decisions using financial accounting data are often interested in comparing firms, deciding whether, for example, to invest in Bank of America or Wells Fargo Bank. An important characteristic of financial accounting data is that it be *comparable* across firms. That is, it is important that when an investor looks at, say, revenue for Bank of America, it represents the same thing that revenue for Wells Fargo Bank does. As a result, financial accounting systems are characterized by a set of rules that define how transactions will be treated.

Cost Accounting

cost accounting
Field of accounting that measures, records, and reports information about costs.

Cost accounting information is designed for managers. Because the managers are making decisions only for their own organization, there is no need for the information to be comparable to similar information in other organizations. Instead, the important criterion is that the information be relevant for the decisions that managers operating in a particular business environment with a particular strategy make. Cost accounting information is commonly used in financial accounting information, but we are concerned primarily with its use by managers to make decisions.

This book is about accounting for costs; it is for those who currently (or will) use or prepare cost information. The book's perspective is that managers (you) add value to the organization by the decisions they (you) make. From a different perspective, accountants (you) add value by providing good information to managers making the decision. The better the decisions, the better the performance of your organization, whether it is a manufacturing firm, a bank, a not-for-profit hospital, a government agency, a school club, or, yes, even a business school. We have already identified some of the decisions managers make and will discuss many of the current trends in cost accounting. We do this to highlight the theme we follow throughout: The cost accounting system is not designed in a vacuum. It is the result of the decisions managers in an organization make and the business environment in which they make them.

Exhibit 1.2 summarizes some of the major differences between financial and cost accounting.

Exhibit 1.2 Comparison of Financial and Cost Accounting

	Financial Accounting	Cost Accounting
• Users of the information (decision makers)	• External (investors, creditors, and so on)	• Internal (managers)
• Important criteria	• Comparability, decision relevance (for investors)	• Decision relevance (for managers), timeliness
• Who establishes or defines the system?	• External standard-setting group (FASB in the U.S.)	• Managers
• How to determine accounting treatment	• Standards (rules)	• Relevance for decision making

Cost Accounting, GAAP, and IFRS

The primary purpose of financial accounting is to provide investors (for example, shareholders) or creditors (for example, banks) information regarding company and management performance. The financial data prepared for this purpose are governed by **generally accepted accounting principles (GAAP)** in the United States and **international financial reporting standards (IFRS)** in many other countries. GAAP and IFRS provide consistency in the accounting data used for reporting purposes from one company to the next. This means that the cost accounting information used to compute cost of goods sold, inventory values, and other financial accounting information used for external reporting must be prepared in accordance with GAAP or IFRS. Although GAAP and IFRS are converging, differences remain. For the reasons discussed in the next paragraph, these differences are not important for our discussion, but you should remain aware of them.

generally accepted accounting principles (GAAP)
Rules, standards, and conventions that guide the preparation of financial accounting statements for firms registered in the U.S.

international financial reporting standards (IFRS)
Rules, standards, and conventions that guide the preparation of the financial accounting statements in many other countries.

In contrast to cost data for financial reporting to shareholders, cost data for managerial use (that is, within the organization) need not comply with GAAP or IFRS. Management is free to set its own definitions for cost information. Indeed, the accounting data used for external reporting are often entirely inappropriate for managerial decision making. For example, managerial decisions deal with the future, so estimates of future costs are more valuable for decision making than are the historical and current costs that are reported externally. Unless we state otherwise, we assume that the cost information is being developed for internal use by managers and does not have to comply with GAAP or IFRS.

This does not mean there is no "right" or "wrong" way to account for costs. It does mean that the best, or correct, accounting for costs is the method that provides relevant information to the decision maker so that he or she can make the best decision.

Customers of Cost Accounting

To management, customers are the most important participants in a business. Without customers, the organization loses its ability and its reason to exist; customers provide the organization's focus. There are fewer and fewer markets in which managers can assume that they face little or no competition for the customer's patronage.

Cost information itself is a product with its own customers. The customers are managers. At the production level, where products are assembled or services are performed, information is needed to control and improve operations. This information is provided frequently and is used to track the efficiency of the activities being performed. For example, if the average defect rate is 1 percent in a manufacturing process and data from the cost accounting system indicate a defect rate of 2 percent on the previous day, shop-floor employees would use this information to identify what caused the defect rate to increase and to correct the problem.

At the middle management level, where managers supervise work and make operating decisions, cost information is used to identify problems by highlighting when

Dispatchers at American Airlines use cost accounting data to evaluate alternatives when weather disrupts operations.

some aspect of operations is different from expectations. At the executive level, financial information is used to assess the company's overall performance. This information is more strategic in nature and typically is provided on a monthly, quarterly, or annual basis. Cost accountants must work with the users (or customers) of cost accounting information to provide the best possible information for managerial purposes.

Many proponents of improvements in business have been highly critical of cost accounting practices in companies. Many of the criticisms—which we discuss throughout the book—are warranted. The problem, however, is more with the misuse of cost accounting information, not the information itself. The most serious problems with accounting systems appear to occur when managers attempt to use accounting information that was developed for external reporting for decision making. Making decisions often requires different information from that provided in financial statements to shareholders. It is important that companies realize that different uses of accounting information require different types of accounting information.

Our Framework for Assessing Cost Accounting Systems

Individuals form organizations to achieve some common goal. Although the focus in this book is on economic organizations, such as the firm, most of what we discuss applies equally well to social, religious, or political organizations. The ability of organizations to remain viable and achieve their goals, whether profit, community well-being, or political influence, depends on the decisions made by managers of the organization.

Throughout the text, we emphasize that it is individuals (people) who make decisions. This theme and the following framework give us a common basis we can use to assess alternative accounting systems:

- Decisions determine the performance of the organization.
- Managers use information from the accounting system to make decisions.
- Owners evaluate organizational and managerial performance with accounting information.

The Manager's Job Is to Make Decisions

LO 1-3
Explain how cost accounting information is used for decision making and performance evaluation in organizations.

Why do organizations employ people? What do they do to add value? For *line employees*, those directly involved in production or who interact with customers, the answer to this question is clear. They produce the product or service and deal with the customer. The job of managers, however, is more difficult to describe because it tends to be varied and ambiguous. The common theme among all managerial jobs, however, is decision making. Managers are paid to make decisions.

Decision Making Requires Information

Accounting systems are important because they are a primary source of information for managers. We describe here some common decisions that managers make. Many, if not most, decisions require information that is likely to come from the accounting system. Our concern with the accounting system is whether it is providing the "best" information to managers. The decisions managers make will be only as good as the information they have.

Finding and Eliminating Activities That Don't Add Value

How do managers use cost information to make decisions that increase value? In their quest to improve the production process, companies seek to identify and eliminate **nonvalue-added activities,** which often result from the current product or process design. If a poor facility layout exists and work-in-process inventory must be moved during the production process, the company is likely to be performing nonvalue-added activities.

nonvalue-added activities
Activities that do not add value to the good or service from the customer's perspective.

Why do managers want to eliminate nonvalue-added activities? An important concept in cost accounting is that *activities cause costs.* Moving inventory is a nonvalue-added activity that causes costs (for example, wages for employees and costs of equipment to move the goods). Reworking defective units is another common example of a nonvalue-added activity. In general, if activities that do not add value to the company can be eliminated, then costs associated with them will also be eliminated.

A well-designed cost accounting system also can identify nonvalue-added activities that cross boundaries in the value chain. For example, companies such as Steelcase, an office furniture manufacturer, have found it worthwhile to allow customers to order products using automated systems such as electronic data interchange (edi) rather than preparing orders and sending them by fax. This change has eliminated the need for two organizations to enter an order into the production scheduling system. (One was the customer preparing the fax and the other was the manufacturer retyping or scanning the fax into the scheduling system.) Not only does this save order entry costs, but it reduces the chances of costly errors in the order.

A major activity of managers is evaluating proposed changes in the organization. Ideas often sound reasonable, but if their benefits (typically measured in savings or increased profits) do not outweigh the costs, management will likely decide against them. The concept of considering both the costs and benefits of a proposal is **cost-benefit analysis.** Managers should perform cost-benefit analyses to assess whether proposed changes in an organization are worthwhile. The concept of cost-benefit analysis applies equally to deciding whether to implement a new cost accounting system. The benefits from an improved cost accounting system come from better decision making. If the benefits do not exceed the cost of implementing and maintaining the new system, managers will not implement it.

cost-benefit analysis
Process of comparing benefits (often measured in savings or increased profits) with costs associated with a proposed change within an organization.

Identifying Strategic Opportunities Using Cost Analysis

Using the value chain and other information about the costs of activities, companies can identify strategic advantages in the marketplace. For example, if a company can eliminate nonvalue-added activities, it can reduce costs without reducing the value of the product to customers. By reducing costs, the company can lower the price it charges customers, giving it a cost advantage over competitors. Or the company can use the resources saved from eliminating nonvalue-added activities to provide better service to customers.

Alternatively, a company can identify activities that customers value and which the company can provide at lower cost. Many logistics companies, such as Owens & Minor, a hospital supply company, offer their customers consulting services and inventory management.

The idea here is simple. Look for activities that do or do not add value. If your company can save money by eliminating those that do not, then do so. You will save your company money. Implement those activities that do. In both cases, you will make the organization more competitive.