

NCACPA Accounting Educators Conference

Integrating Data Analytics into Accounting Courses

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What will we cover today?

- What is motivating us? Goals and Benefits
- What analytics skills should we develop?
- What challenges do we face and what are some approaches that can help us?
- What resources might be helpful?
- What questions do you have?

What is motivating us?

Goals and Benefits

- Education needs to address questions such as:
 - What are the key learning outcomes that align with the needs of employers?
 - How much data analytics is needed for students entering the accounting profession?
- AACSB Standard A5: Information Technology Skills, Agility, and Knowledge for Accounting Graduates and Faculty:
 - Information systems and business processes including data creation, manipulation/management, security, and storage.
 - Data analytics including statistical techniques, clustering, data management, modeling, analysis, text analysis, predictive analytics, learning systems, or visualization.
 - Technology agility among learners and faculty should be developed, recognizing the need for continual learning of new skills needed by accounting professionals.

What analytics skills should we develop?

At a high level, accountants need to:

1. Be able to ask the right questions (critical thinking skills)... questions which can be answered with data.
2. Understand data, how to manipulate it, and be able perform appropriate analyses.
3. Be able to communicate the results of the analyses.

Survey Results

‘Infusing data analytics into the accounting curriculum: A framework and insights from faculty’

- Which data analytics skills should be taught?
 - Survey found most important analytic skill is developing students’ ability to ask questions that can be answered using data
 - This suggests that the foundational competencies of analytical thinking and problem solving should be emphasized in the accounting curriculum.
 - The development of students’ ability to effectively communicate processes and outcomes of data analytics was the second most important topic in data analytics education.

What challenges do we face?

- What to teach?
- How to teach it?
- How to deal with time constraints and complexity?
- What tools should we use?
- Where can I get data?
- What are some useful resources?

What to teach?

- Critical thinking skills
 - Asking the right questions
 - Ability to identify data needed to address the question
- Understanding data
 - Types of data
 - Extract, Transform, and Load (ETL)
- Analysis Skills
 - Descriptive, Diagnostic, Predictive, and Prescriptive
- Communications skills
 - Creating insightful dashboards
 - Written and oral communication of analytics projects

Some Examples – Combining Accounting Topics with Analytics

- Analyzing fixed asset data to evaluate the impact of a change in useful lives. Or identifying ‘old’ assets which may no longer be in use.
- Evaluating LCM using inventory data and sales data.
- Evaluating actual results vs budget.
- Uncertain tax positions – evaluating the likelihood of outcomes.
- Revenue recognition – evaluating the likelihood of outcomes related to variable consideration.

How to teach it?

Thinking beyond visualizations

- Focus on a critical thinking skill:
 - Developing a question
 - Identifying data sources
 - Dealing with uncertainty (reasonable approaches and answers given the circumstances vs one right answer)
 - Assumptions and limitations in approach and how they might be addressed
 - Where would we go from here?
- Narrow the scope:
 - Analyze results – ETL & analytics provided, analyze results and provide insight, conclusion, answer to question, decision, etc.
 - Communicate results – explain the question, data, analysis performed, and conclusion (insight, decision, recommendation).

Example: Review of Critical Accounting Policies and Estimates

Assignment: Select a publicly held company and review the 'Critical Accounting Policies and Estimates' section of the 10-k. Select a policy or estimate and identify the professional judgments made, their implications, uncertainties, etc. Copy the text of the policy or estimate from the 10-k below the table.

1. Name of company and critical accounting policy or estimate and account(s) impacted?
2. What uncertainties need to be addressed?
3. What assumptions would likely be needed?
4. What are the implications if judgments related to this area are flawed?
5. What data or information is relevant to making this judgment?
6. Might different people hold different opinions regarding judgment and outcome – management vs auditors?

Example: Mini Cases

Learning Objectives for Mini Cases

- Increase comfort with open-ended questions.
- Explore some of the key issues we struggle with at each stage of critical thinking development.
- Recognize that for most real-world problems we face in practice there is no one 'correct' or perfect solution. We aim for a well-reasoned and supported solution based on the facts and circumstances of the situation and adjust as new information becomes available.

Example: Mini Cases, cont.

Allowance for Uncollectible Accounts

The low-volume high dollar B2B company

“The company has approximately \$100 million in annual sales to a few hundred customers. The top 10 customers account for ~25% of sales and the average sales transaction is ~\$75,000. Uncollectible amounts (bad debts) are low and occur infrequently and for the past 2 years totaled \$30,000 and \$80,000, respectively. It is not uncommon to have 5% of receivables past 90 days, but most of these amounts are eventually collected and many times the delays in payment relate to contractual or administrative issues rather than inability or refusal to pay.”

The high-volume low dollar B2C company

“The company has approximately \$100 million in annual sales to thousands of customers. The average sales transaction is \$1,000. Uncollectible amounts tend to correlate with sales and historically have been stable at 0.5% - 1.5% of sales. Most receivables invoices are paid within terms and amounts past 90 days have a high probability of ultimately being uncollectible.”

Example: Mini Cases, cont.

1. What approaches could be used to estimate the allowance for uncollectible accounts?
2. What uncertainties do we need to address in our approach?
3. What assumptions does our approach rely on?
4. How could we evaluate the quality or reliability of our approach and assumptions?
5. What are the implications if our approach or assumptions are flawed?
6. What data or information is relevant to support our conclusion?
7. How much support does the data or information in (6) provide? Do we need other data to adequately justify our position?
8. In considering the approaches in (1) above, which would you choose and why?
9. Might different people hold different opinions regarding the approach and outcome – management vs auditors?

Compare the two scenarios above. How would you support the position that different approaches are appropriate and result in a more accurate estimate of bad debts?

Example: Mini Cases, cont.

Areas I used in mini cases:

- Allowance for uncollectible accounts
- Excess and obsolete (E&O) inventory reserve
- Product Warranty Reserve
- Fixed asset replacement project
- Customer demand projection

How to find the time & manage complexity?

- Keep it simple! Start small, get feedback, grow.
- Focus on one or a few related skills (see slide 9).
- Use stackable assignments. Create a comprehensive assignment and then break it into smaller assignments completed in phases:
 - Question development
 - Understanding the data
 - Analytics approach
 - ETL
 - Analyze
 - Communicate

What tools should we use?

- Recall ACCSB Standard A5... development of technology agility. We want students to be exposed to multiple technologies, but also to graduate with some deeper skills.
- Need for balance between scope and depth across courses.
- **Don't dismiss Excel**
 - Available and familiar
 - Employers expect students are expected to have solid Excel skills
 - Great tool for developing the basics
 - Easier to manage when incorporating analytics into a non-analytics class and trying to manage time & complexity
 - Can introduce more advanced skills and concepts – pivot table/chart, Power Pivot, Power Query.

Where can we get data?

- Nature and size of data sets:
 - Simple smaller (single or few tables, 100's of rows) – introduction to concepts
 - Complex larger (multi-table, 1000's of rows) – upper level undergrad and graduate courses
- Firm websites – cases
- Databases such as WRDS, Calcbench, Audit Analytics
- Create your own!
 - Not as difficult as you might think and provides some benefits (control over type and size of data, change data each semester, realistic but randomness)

How can I create data using Excel?

	A	B	C	D	E	F	G	H	I	J
1	% Sales	Customer	Avg. Sale	Std. Dev.	Min	Max				
2	0%	A	10,000	2,000	8,000	12,000				
3	40%	B	5,000	1,000	3,000	6,000				
4	60%	C	20,000	4,000	15,000	25,000				
5										
6	Invoice No.	Customer	Amount (normal)	Amount (min max)						
7	1	=VLOOKUP(RAND(),\$A\$2:\$B\$4,2,TRUE)								
8	2	A	=NORM.INV(RAND(),VLOOKUP(B8,\$B\$2:\$C\$4,2,FALSE),VLOOKUP(B8,\$B\$2:\$D\$4,3,FALSE))							
9	3	A	11,398	=RANDBETWEEN(VLOOKUP(B9,\$B\$2:\$E\$4,4,FALSE),VLOOKUP(B9,\$B\$2:\$F\$4,5,FALSE))						
10	4	B	5,869	4,136						
11	5	C	20,952	16,623						

Using this approach I have created GL, journals, sales and purchases transactions, AR data for aging, fixed assets detail, inventory, etc.

What resources might be helpful?

- ‘Infusing data analytics into the accounting curriculum: A framework and insights from faculty’:
<https://www.sciencedirect.com/science/article/pii/S0748575116301257>
- IMA competency framework (see technology and analytics domain):
<https://www.imanet.org/insights-and-trends/the-future-of-management-accounting/ima-management-accounting-competency-framework?ssopc=1>
- CPA Evolution model curriculum (see analytics components):
<https://thiswaytocpa.com/program/modelCPAcurriculum/>
- ‘Resources for teaching data analytics in accounting’ from JOA:
<https://www.journalofaccountancy.com/newsletters/extra-credit/teaching-data-analytics-in-accounting.html>
- Firm (Deloitte, EY, KPMG, Pwc, etc.) university alliance websites
- LinkedIn Learning
- YouTube – Galit Shmueli’s channel is excellent!

What questions do you have?

DRAFT

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To continue the conversation...

I invite you to contact me with questions or to discuss thoughts and ideas...

I would enjoy doing so!

My email: tcdow@ncsu.edu