



Faculty Hour

A webcast series



Using AICPA Resources to Develop Stronger Critical Thinking Skills in EVERY Accounting Course

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October 21, 2022

Learning Objectives:

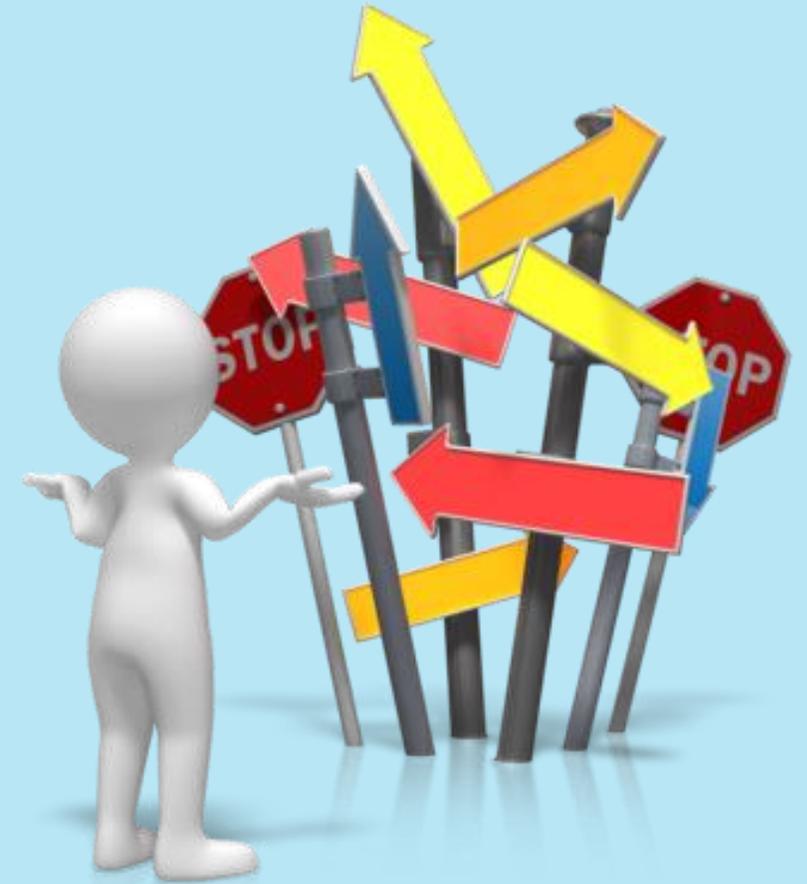
- Identify the characteristics of critical thinking for accounting education
- Analyze the impact of student assumptions on critical thinking development
- Determine the cognitive levels demonstrated in very short student writing
- Apply cognitive levels to Bloom's taxonomy
- Select critical thinking learning activities for an accounting course
- Analyze educational design through discussion with other accounting educators



How Do Accountants Define Critical Thinking?

- Decision Making Skills
- Used With:
 - Accounting Technical Knowledge
 - Communication Skills
 - Other Professional Skills (Objectivity, Skepticism, Due Care, Continuous Improvement, Ethics, etc.)

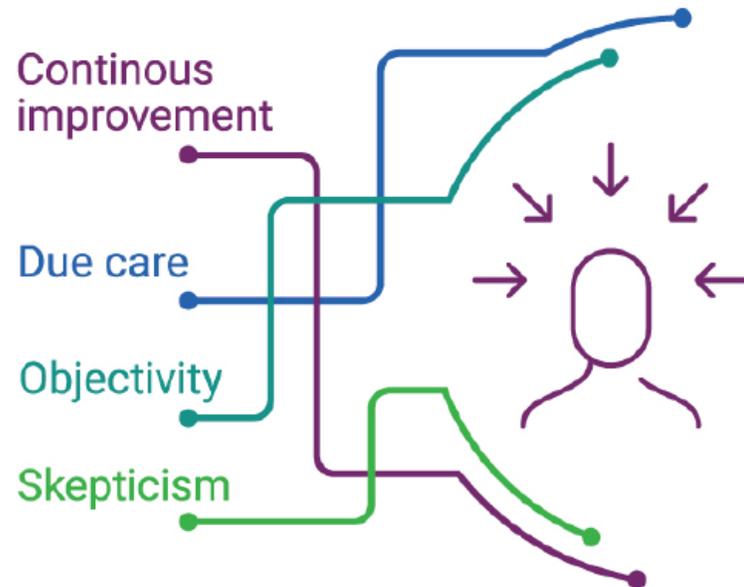
See examples and discussion in Wolcott & Sargent, 2021, Critical Thinking in Accounting Education: Status and Call to Action, *Journal of Accounting Education* 56



Critical Thinking Model

AICPA Faculty Guide: *How to Help Your Students Become Better Critical Thinkers*, Figure 2, p. 6

Mindset



01 Identify

- Identify the main purpose plus embedded, subsidiary problem(s).
- Recognize open-ended/ambiguous problem(s).
- Identify relevant information for analysis (e.g., accounting knowledge, concepts, techniques, stakeholder(s) and goals/preferences).

02 Analyze

- Apply and interpret relevant knowledge, concepts and techniques.
- Explore potential causes, stakeholder effects and interrelationships.
- Question the quality of information and assumptions.
- Summarize pros and cons of viable alternatives.

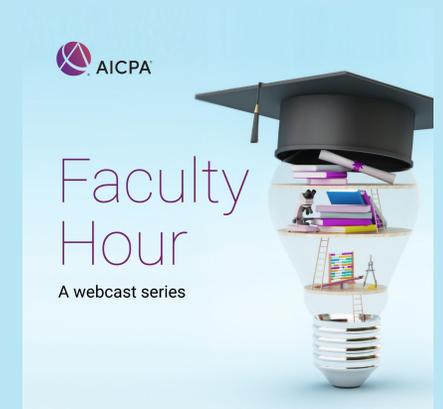
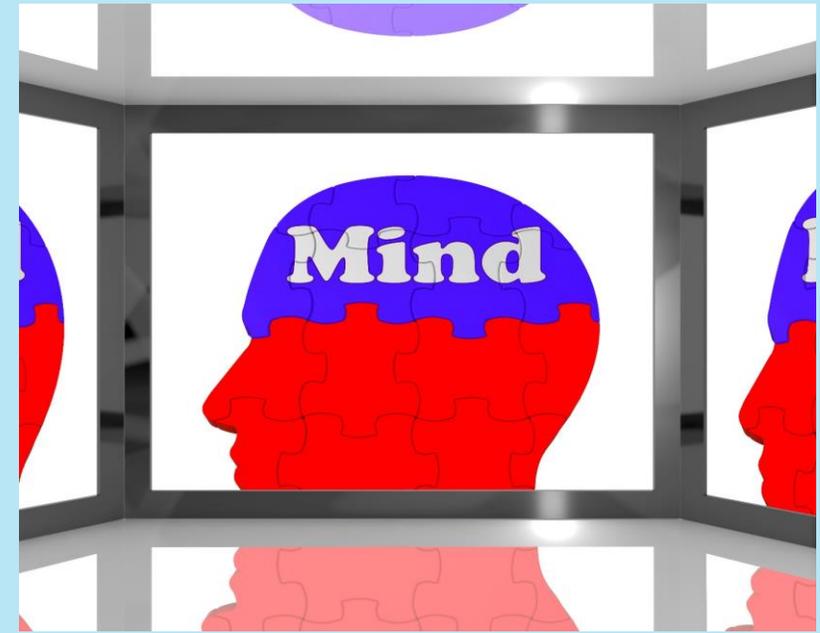
03 Conclude

- Identify/develop appropriate decision criteria, and use the criteria to reach convincing conclusion(s).
- If appropriate, provide additional advice (e.g., identify implementation issues).

Communications



Schema Theory, Cognitive Development, and Critical Thinking



Schema Theory

Schemas

- Abstract and dynamic representations of knowledge in the brain (subjects, events, places, procedures, persons, etc.)
- Based on past experiences
- Include expectations, inferences, and misconceptions
- Develop throughout life



See, for example:

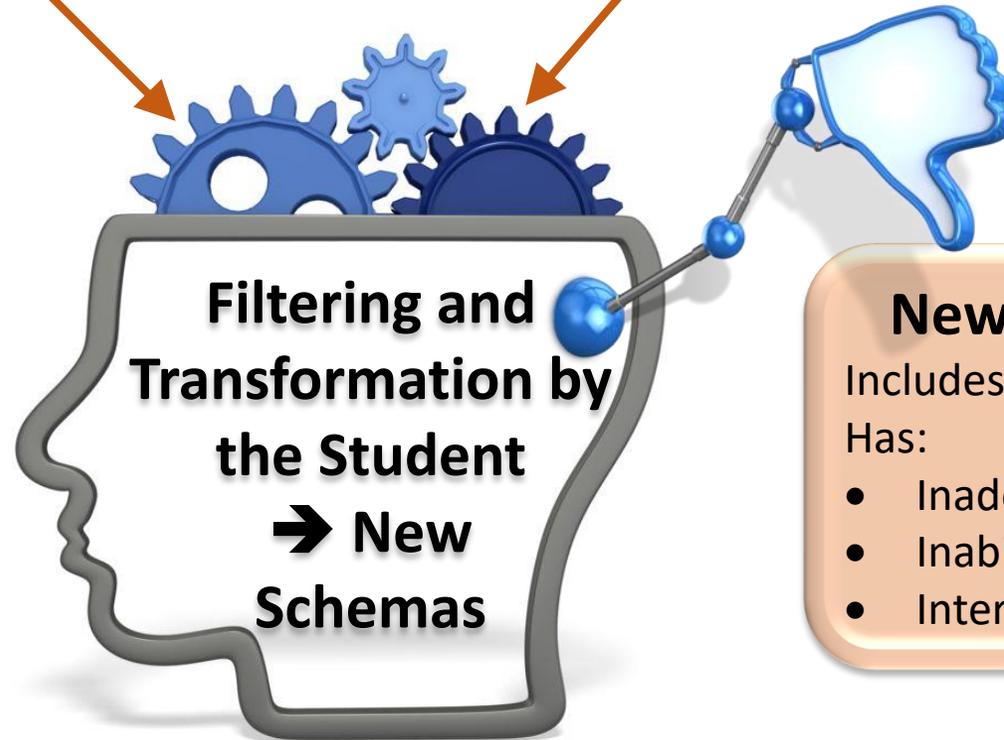
- [Schema Theory and Concept Formation.pdf \(mit.edu\)](#)
- Cross and Steadman, 1996, *Classroom Research: Implementing the Scholarship of Teaching*, San Francisco: Jossey-Bass Publishers, pp. 36-56.

Schema Theory and Student Learning

Student's Prior Schemas

New Information

Intended learning (new knowledge, skills, attitudes, integration)



Filtering and Transformation by the Student
→ **New Schemas**

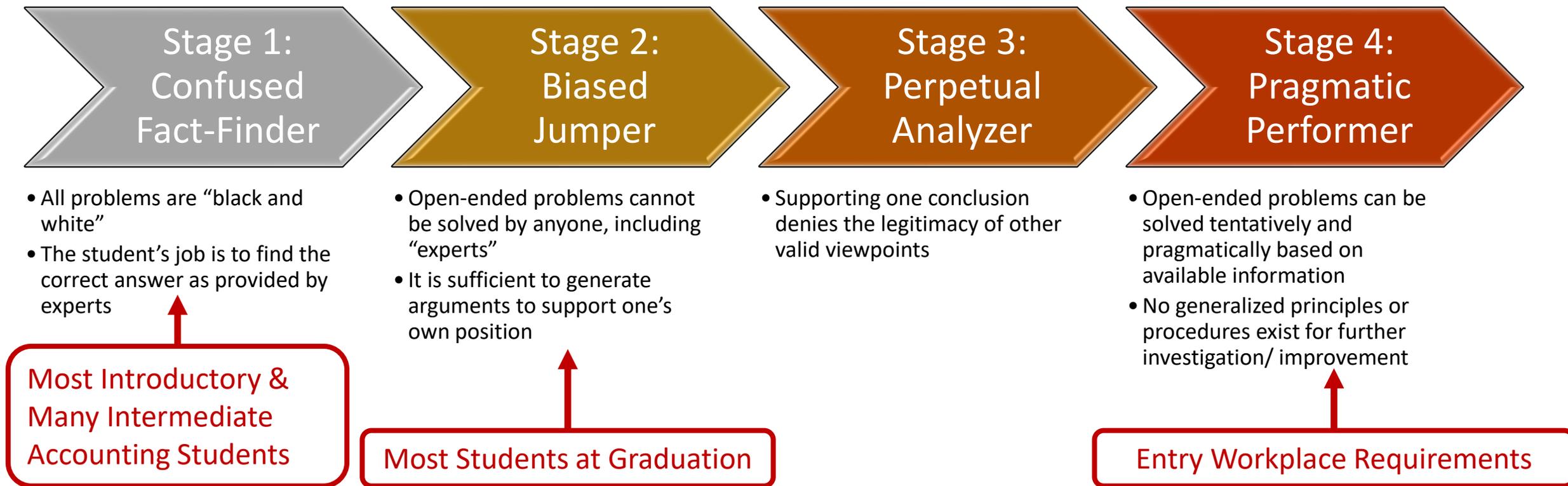
New Information Not “Learned”

Includes New Information for Which Student Has:

- Inadequate prior schemas
- Inability to make inferences
- Interfering misconceptions

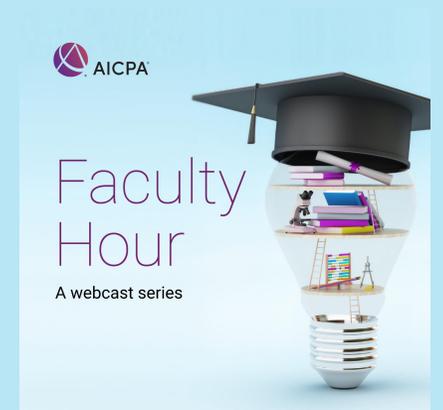
KEY Beliefs That Hinder Progress

Adapted from AICPA Faculty Guide p. 9, Figure 4. This figure omits Stage 5, which is beyond entry-level expectations.



At Each Stage: Students will not develop higher-stage critical thinking skills until their schema changes → Education needs to focus on knowledge, skills, AND beliefs.

Examples of Student Thinking: Seattle Sandwich Case



Seattle Sandwich Case



Brief Business Description

- Seattle Sandwich makes and sells 7 types of sandwiches to approximately 40 customers (lunch carts in or near downtown Seattle)
- Key Personnel:
 - Owner no longer involved in day-to-day operations; enjoys creating new ideas for the daily sandwich special and daily vegan wrap
 - Manager of operations
 - Manager of sales and marketing
 - Internal accountant
- Case scenarios involve budgeting and variances, including planning and operational issues
- Student plays the role of an accounting intern who is assisting in the development of next year's budget

Example: Case Question

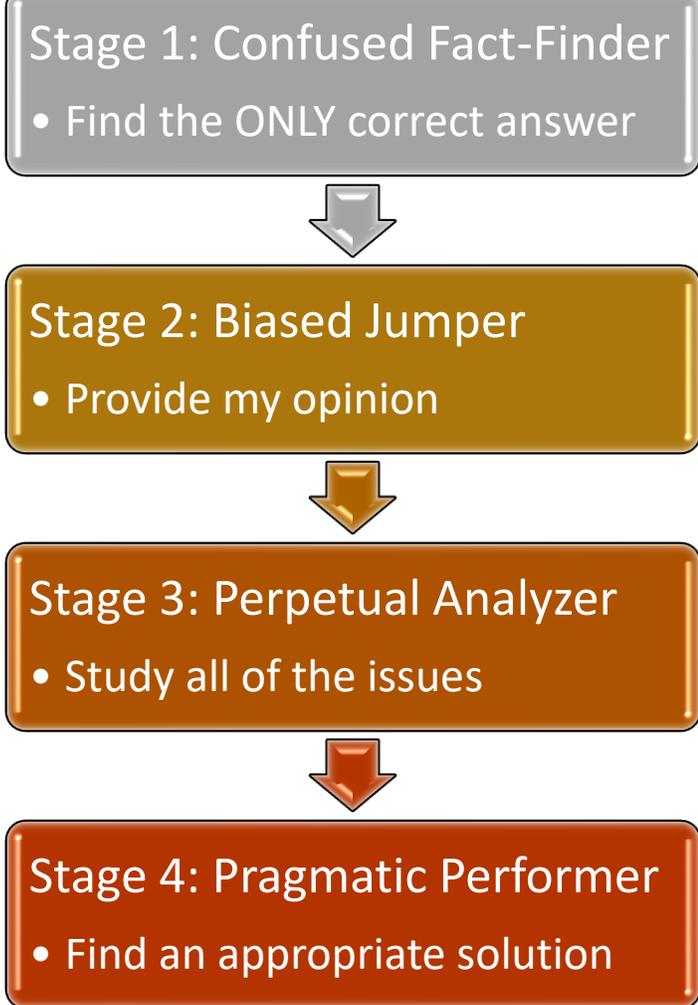
You are having difficulty deciding how to budget production labor costs. The production manager sets a weekly schedule for hourly workers, adjusting the schedule for changes in sales volumes. In addition, the manager can send workers home early if sales are lower than expected or production goes more quickly than usual. In previous budgets, hourly labor was treated as a variable cost. However, a certain number of workers is generally needed, and the manager is reluctant to send workers home early too often for fear of losing good employees. Accordingly, you are wondering whether hourly labor costs should be treated as a fixed cost in next year's budget.

Seattle Sandwich Case: Student X



My idea would be to make it a variable cost and not change it. Since there is no set amount of time someone could be there they cannot be certain it would be a fixed cost. For this reason it would have to stay as a variable. No matter how much they can try to make certain set hours, it would be divided among several people instead of one. For this reason it would be hard to make it a fixed because it would involve several accounts as opposed to one set account.

Which Schema Does This Student Seem to Be Using?

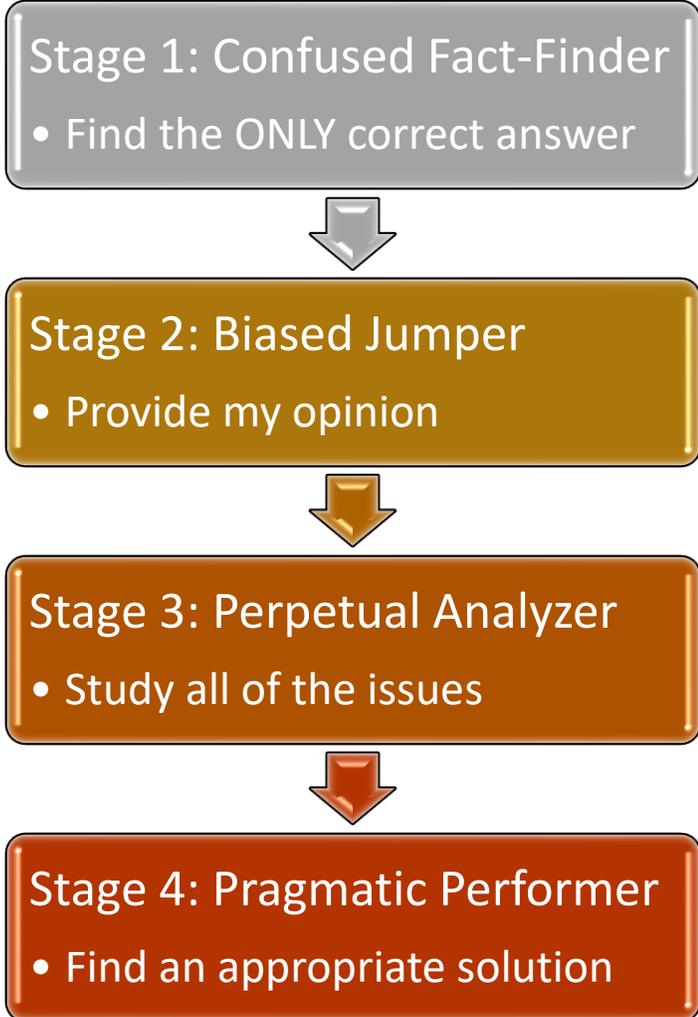


Seattle Sandwich Case: Student Y



My recommendation for next year's budget is that hourly labor costs should be fixed, rather than the past variable. If there needs to be a certain number of workers to do the production, then schedule as many workers as needed and do send them home early if they run out of work to do. This might make some good employees that are needed angry and quit. To avoid this, schedule less workers in the already known slow days, rather than just sending someone home. Also, if next year's budget is changed to fixed costs, the manager won't have to keep figuring out different totals—but instead have the same numbers to work with every time. This would allow more time for improving the production.

Which Schema Does This Student Seem to Be Using?



Seattle Sandwich Case: Student Z



Based on the information given, I would like to recommend that hourly labor costs be treated as a mixed cost.

I would recommend reviewing last year's pattern of sales (the cost driver) in the budget and possibly time cards to figure as closely as possible the fixed hourly labor costs by narrowing down any hours that are repeated every week along with any seasonal hours that happen every year.

For an estimate of the variable cost, I recommend an average of all hours that did not remain constant.

Which Schema Does This Student Seem to Be Using?

Stage 1: Confused Fact-Finder

- Find the ONLY correct answer



Stage 2: Biased Jumper

- Provide my opinion



Stage 3: Perpetual Analyzer

- Study all of the issues



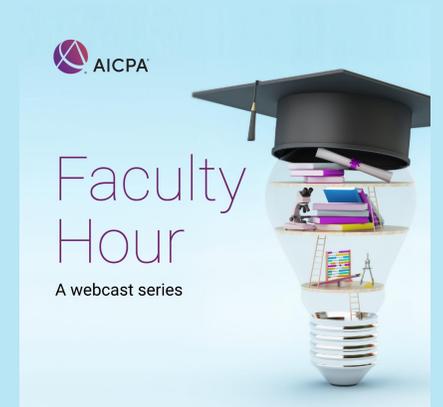
Stage 4: Pragmatic Performer

- Find an appropriate solution

Critical Thinking Skills Rubric

Component of Critical Thinking Model	Stage 1 Little/No Critical Thinking (Confused Fact-Finder)	Stage 2 Partial Critical Thinking (Biased Jumper)	Stage 3 Emergent Critical Thinking (Perpetual Analyzer)	Stage 4 Competent Critical Thinking (Pragmatic Performer)
Identify	<ul style="list-style-type: none"> Recites purpose as given, or Identifies an inappropriate problem 	<ul style="list-style-type: none"> Identifies the clearly-evident problem Recognizes that the problem is open-ended/ambiguous 	<ul style="list-style-type: none"> Identifies the main purpose Identifies relevant stakeholders and their possible goals/preferences Identifies relevant accounting knowledge, concepts and techniques 	<p>In addition to Stage 3:</p> <ul style="list-style-type: none"> Identifies important embedded, subsidiary problem(s)
Analyze	<ul style="list-style-type: none"> Applies calculations, definitions, or other “textbook” concepts Presents irrelevant information Misinterprets calculation(s) and/or concept(s) 	<ul style="list-style-type: none"> Applies and describes the effects of relevant calculations and/or concepts Partially analyzes alternatives, focusing on information supporting own viewpoint Discounts other viewpoint(s) 	<ul style="list-style-type: none"> Thoroughly and objectively applies and interprets relevant calculation(s) and concept(s) Explores causes, stakeholder effects and interrelationships Questions the quality of information and assumptions Thoroughly discusses the pros and cons of viable alternatives 	<ul style="list-style-type: none"> Objectively analyzes the most important relevant information, implications, consequences and viewpoints Evaluates the quality of information and assumptions, and adapts interpretations (as needed) Summarizes the most important pros and cons of viable alternatives
Conclude	<ul style="list-style-type: none"> Instead of a conclusion, provides facts, definitions, or other “authoritative” statements 	<ul style="list-style-type: none"> Reaches a biased conclusion that is consistent with analyses 	<ul style="list-style-type: none"> Reaches no conclusion, or Provides a conclusion with little or no justification 	<ul style="list-style-type: none"> Identifies/develops appropriate criteria, and uses the criteria to reach convincing conclusion(s) If appropriate, provides value-added advice (e.g., identifies implementation issues)

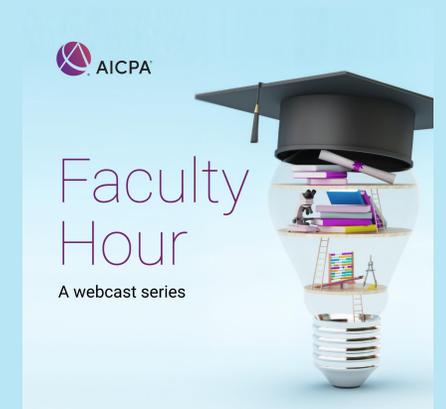
Critical Thinking Development and Bloom's Taxonomy



Cognitive Development Stages and Bloom's Taxonomy

Revised Bloom's Taxonomy (Anderson et al.,	Stages Described in AICPA Faculty Guide			
	Stage 1 Confused Fact-Finder	Stage 2 Biased Jumper	Stage 3 Perpetual Analyzer	Stage 4 Pragmatic Performer
Apply Carry out or use a procedure in a given situation	Carry out a well-defined procedure in a familiar setting	Use relevant information to carry out a familiar procedure	Use relevant information to carry out a procedure in an unfamiliar setting	Efficiently carry out a procedure in a highly unfamiliar setting
Analyze Break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose	Locate information and viewpoints in a well-defined problem	Distinguish between relevant and irrelevant information; focus on support for own viewpoint	Thoroughly and objectively explore relevant information, viewpoints, and assumptions; outline evidence for and against alternatives	Distinguish between important and unimportant parts; thoroughly and objectively integrate important information and viewpoints
Evaluate Make judgments based on criteria and standards	Detect correct solutions/ conclusions for a well-defined problem	Determine own viewpoint/conclusion	Detect reasoning within individual viewpoints; discover limitations; delay or avoid concluding across viewpoints	Determine and apply overarching criteria/ priorities for drawing conclusions; detect key limitations
Create Put elements together to form a coherent or functional whole; reorganize elements into a new pattern or structure	Reorganize procedures (e.g., rearrange a spreadsheet) when performing a well-defined task	Generate a work plan based on own preferences	Generate new hypotheses to explore observations or results	Develop new criteria or methods for distinguishing between hypotheses or selecting among alternative models or procedures

Critical Thinking Learning Activities Across the Curriculum



Data Analytics and Critical Thinking

As explained by Jeff Thomson (Reding & Newman, 2017):

“Data analysis and critical thinking skills are interdependent. Data analysis requires you to think critically by probing, connecting disparate facts, synthesizing, etc. Likewise, critical thinking is enabled by thinking analytically and applying tools to help extract insights and actionable information from data. (p.1) “



Data Analytics Drivers

Importance to the overall curriculum

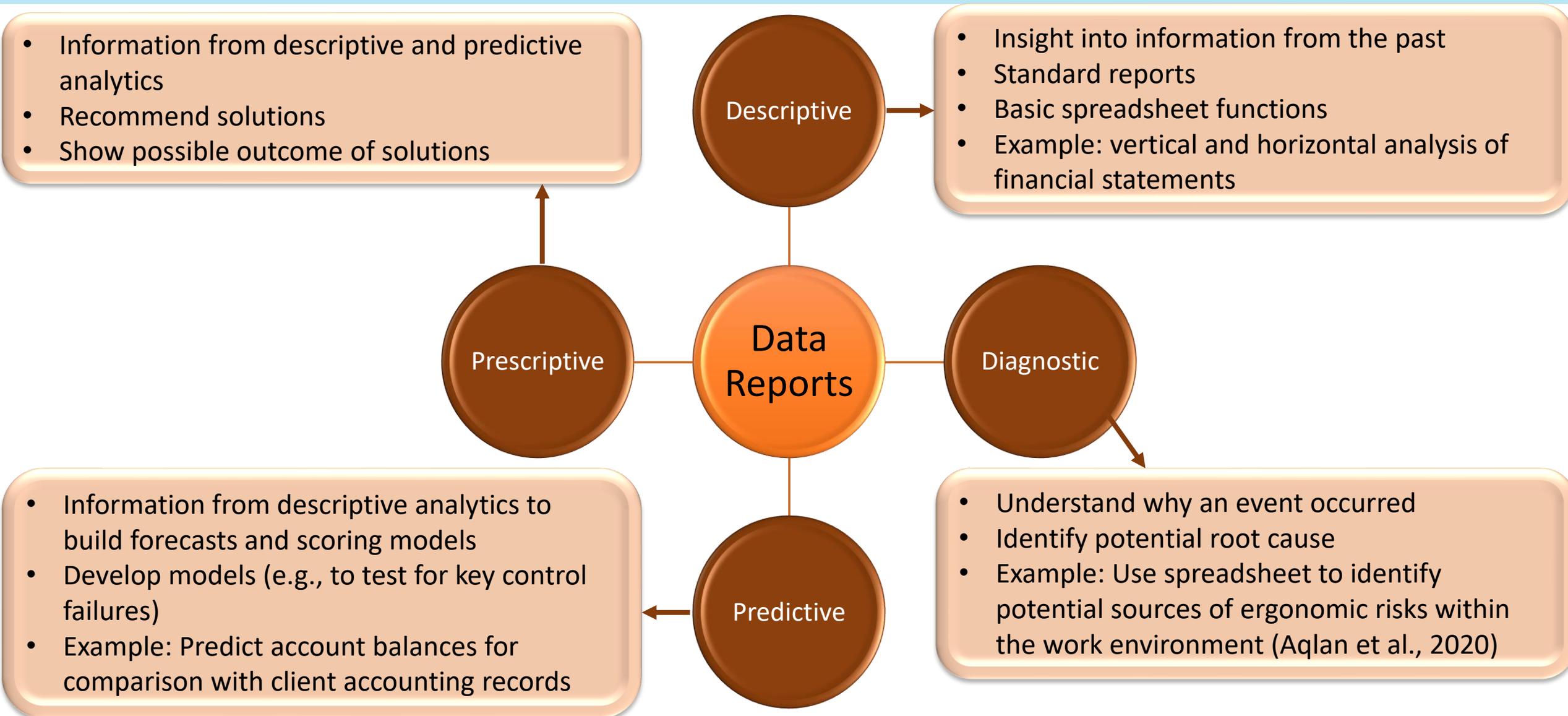
- AIS concepts and the associated data analytics must be taught as part of the accounting curriculum (Borthick, 1996).
- Business and accounting schools need to teach data analytics to their students because it is a core business discipline (Vasarhelyi et al., 2017)
- It is crucial to teach accounting students the most commonly used business software, and those pieces of software cover multiple categories such as spreadsheets, databases, data visualization, and accounting/ERP (Dzuranin et al., 2018).

Standards driving data analytics into the curriculum

- PCAOB Auditing Standard (AS) 2305 – Analytical Procedures – “are an important part of the audit process and consist of evaluations of financial information made by a study of plausible relationships “
- AACSB Standard A5 - “Data analytics including, for example, statistical techniques, clustering, data management, modeling, analysis, text analysis, predictive analytics...”
- AACSB Business Standard 9 - accredited programs should “integrate current and emerging technologies, including the application of statistical tools and statistical techniques, data management, data analytics.....”

Main Types of Data Analytics for Accounting Courses

Adapted from
Appelbaum et al., 2018

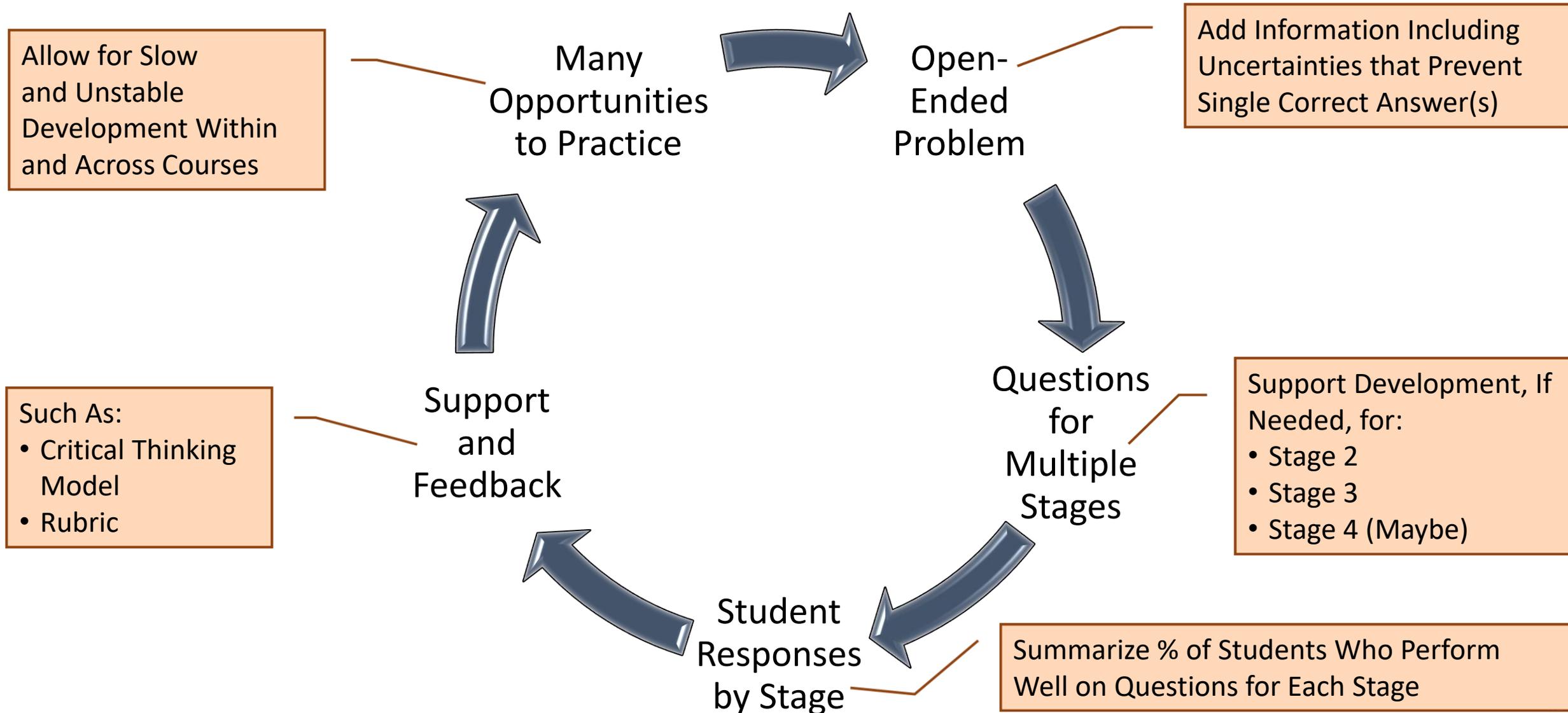


Data Analytics in the Curriculum

Critical thinking learning activities

- Microsoft Excel- The business problems include questions on inventory tracking or determining the most profitable items per unit, and they could create a visual display to summarize data into useful information for managerial decision-making. (descriptive analytics)
- MS Access – Students create queries and reports to help assess the data. Questions to be answered could include a) what was the average amount billed per transaction, b) what was the average amount billed for each service type, and c) what was the average amount billed per client type. (descriptive analytics) and look at why there were differences throughout the period (diagnostic analytics).
- Quickbooks - The deliverables could include traditional financial statements, business reports (A/R aging, transactions lists, purchases by item detail, and inventory status), a summary of the data within the main reports (descriptive analytics), explanations of why key metrics changed (diagnostic analytics), produce forecasts of the income statement, statement of cash flows, and balance sheet for each of the next two years (predictive analytics), and using the data to help make suggestions on how to improve key metrics of the business (prescriptive analytics).
- Tableau/Power BI – Students could present views on sales and profits (descriptive analytics), assess what products may need to be priced differently or possibly discontinued (predictive analytics) and outline additional pricing and product line strategy decisions (prescriptive analytics).

Design an Assignment for Critical Thinking



Assignment Design: Complexity

Adapted from AICPA Faculty Guide
p. 32, Figure 19

Component of Pathways Vision Model	Stage 1 The Confused Fact-Finder	Stage 2 The Biased Jumper	Stages 3 and 4 The Perpetual Analyzer The Pragmatic Performer
Economic Activity	<ul style="list-style-type: none"> • Straightforward, easily understood events and circumstances 	<ul style="list-style-type: none"> • Moderate scope and interaction of events and circumstances 	<ul style="list-style-type: none"> • Realistic scope of activities that may be highly complex
Shades of Gray	<ul style="list-style-type: none"> • A few sources of uncertainty 	<ul style="list-style-type: none"> • Multiple sources and degrees of uncertainty 	<ul style="list-style-type: none"> • Many sources and degrees of uncertainty
Accounting Judgments	<ul style="list-style-type: none"> • Few accounting judgments 	<ul style="list-style-type: none"> • Several accounting judgments 	<ul style="list-style-type: none"> • Many accounting judgments
Useful Information	<ul style="list-style-type: none"> • Information is either useful or not useful/irrelevant 	<ul style="list-style-type: none"> • Questions exist about the degree of information usefulness 	<ul style="list-style-type: none"> • Many questions exist about information usefulness
Good Decisions	<ul style="list-style-type: none"> • Few stakeholders and uncomplicated decisions 	<ul style="list-style-type: none"> • Multiple stakeholders and decisions involving multiple factors 	<ul style="list-style-type: none"> • Many stakeholders with divergent interests and complex decisions
Consequences	<ul style="list-style-type: none"> • Few consequences with clear-cut cause and effect relationships 	<ul style="list-style-type: none"> • Some uncertain cause and effect relationships 	<ul style="list-style-type: none"> • Many complex and uncertain cause and effect relationships