Improving Critical Thinking through Debiasing Classroom Design
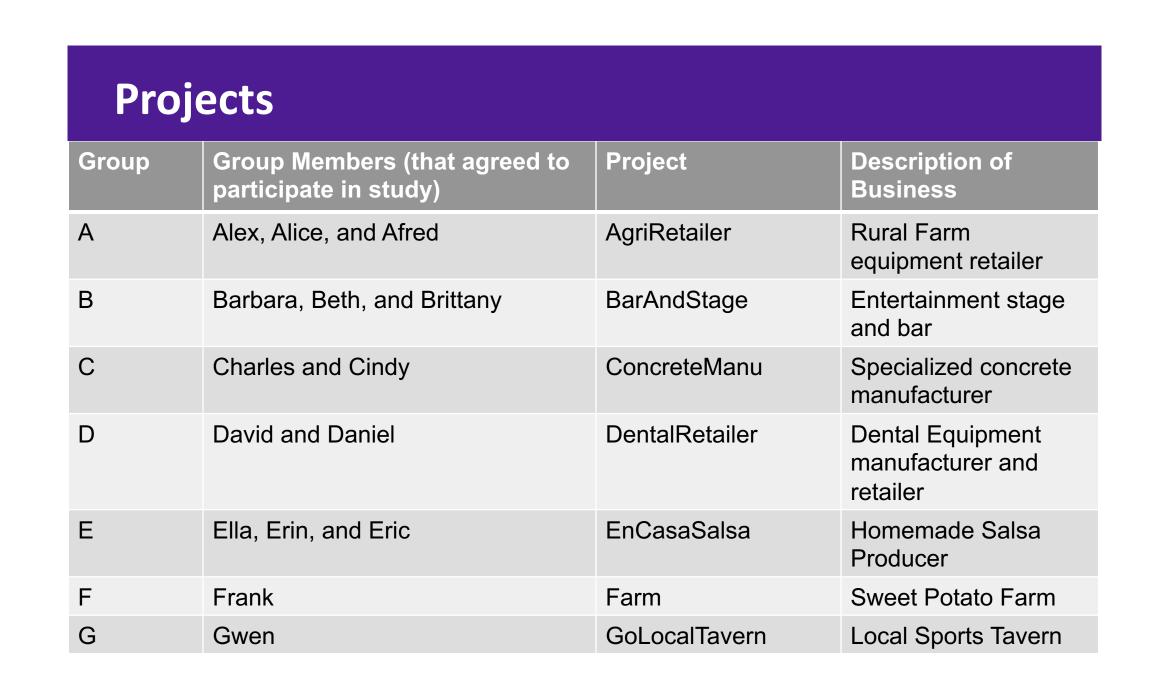
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Research Question

What type of cognitive approach can systematically assess the effectiveness of tools and techniques in an Information Systems (IS) course with a semester-long PBL project to improve students' decision-making?
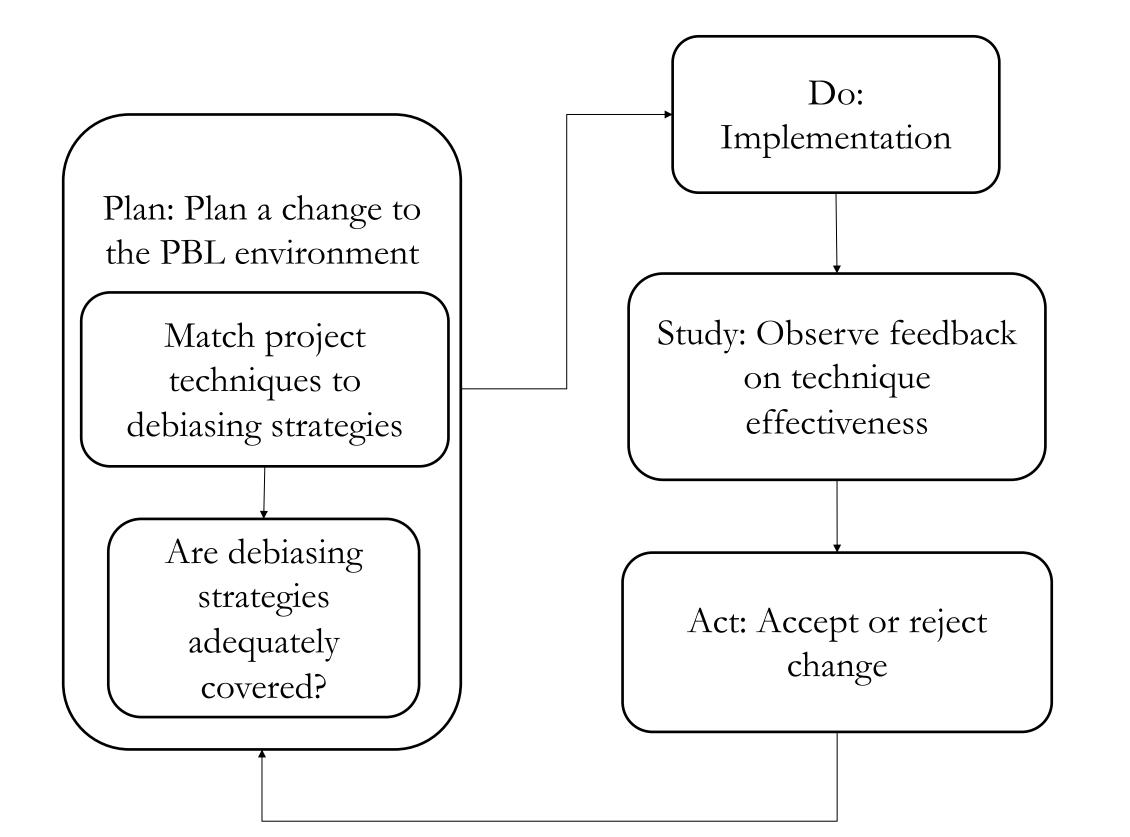
Methodology

A case study design in an e-commerce course allowed us to provide an illustrative case that demonstrates how a debiasing framework could be used within a continuous improvement cycle. The course was required for the Management Information Systems program of an Association to Advance Collegiate Schools of Business (AACSB) accredited college in the United States. The course contained a PBL project that lasted the entire semester (sixteen weeks) and included a variety of techniques, including reading the textbook, participating in discussions, observing, completing focused worksheets, writing peer reviews, receiving feedback, working in teams, writing a final report, and interacting with real businesses.

Associate Professor of Management Information Systems

Plan-Do-Study-Act Continuous Improvement Process

Projects

Group	Group Members (that agreed to participate in study)	Project	Description of Business
A	Alex, Alice, and Afred	AgriRetailer	Rural Farm equipment retailer
B	Barbara, Beth, and Brittany	BarAndStage	Entertainment stage and bar
C	Charles and Cindy	ConcreteManu	Specialized concrete manufacturer
D	David and Daniel	DentalRetailer	Dental Equipment manufacturer and retailer
E	Ella, Erin, and Eric	EnCasaSalsa	Homemade Salsa Producer
F	Frank	Farm	Sweet Potato Farm
G	Gwen	GoLocalTavern	Local Sports Tavern

Debiasing strategies	Classroom techniques								
	Reading the textbook	Participating in class	Observing examples	Completing the worksheets	Writing peer reviews	Reading feedback by others	Working in groups	Interacting with client	Writing final report
Taking different perspectives	x				x	x			
Decomposing the decision task				x					
Creating awareness of decision biases					x	x			
Learning about task domain	x	x	x						x
Requiring consensus							x		x
Raising the stakes					x	x		x	x
Reducing environmental complexity				x					

Take-aways

- The project showed that multiple project techniques interrelate and impact debiasing strategies multiple ways.
- The debiasing framework provided evidence that a change to the course was effective while simultaneously suggesting weaknesses in the current design to be fixed in future cycles.
- The survey showed evidence *that* there was a problem – participant observation and archival information helped pinpoint *why* there was a problem.

Undergraduate Student Research Projects

- Holden Jones, Honors Research Thesis, 2015
  - "Big Data Analytics Tools: A Bibliographic Review"
- Preston Parker, University Studies, 2021
  - "Automotive Digital Retailing"
- Austin Clinefelter, Honors Research Thesis, 2024
  - "Teaching Fraud Prevention to Seniors"

Pedagogical Publications

- Drake, J. R. (2010). *The Hierarchy of Concepts in Introductory Information Systems Course: Using History as a Guide to Curriculum Development.* Paper presented at the Decision Sciences Institute Annual Meeting, San Diego, CA.
- Drake, J. R. (2012). A critical analysis of active learning and an alternative pedagogical framework for introductory information systems courses. *Journal of Information Technology Education: Innovations in Practice, 11*(1), 39-52. doi:10.28945/1546
- Drake, J. R. (2019a). *eCommerce: A Stakeholder Perspective* (1st ed.). Burlington, VT: Prospect Press.
- Drake, J. R. (2019b). *Improving IS Student Decisions: A Framework for Debiasing Projects.* Paper presented at the EdSIGCon, Cleveland, OH.
- Drake, J. R., & Gibson, B. (2010). *Establishing Knowledge Networks through Student Blogging: Workshop.* Paper presented at the Scholarship of Teaching and Learning Conference, Ypsilanti, MI.
- Drake, J. R., O'Hara, M., & Seeman, E. (2015). Five Principles for MOOC Design: With a Case Study. *Journal of Information Technology Education: Innovations in Practice, 14.*
- Drake, J. R., & Paul, R. (2017). *Debiasing problem identification for e-commerce initiatives.* Paper presented at the Decision Sciences Institute Annual Meeting, Washington, DC.
- Drake, J. R., & Paul, R. (2021). A Cognitive Approach to Assessing the Materials in Problem-Based Learning Project. *Journal of Information Technology Education: Innovations in Practice, 20,* 59-79. doi:10.28945/4812

Student Survey Feedback

DEBIASING STRATEGIES	PROJECT TECHNIQUES									
	Reading the textbook	Participating in class	Observing examples	Completing the worksheets	Writing the peer reviews	Reading about feedback	Working in groups	Interacting with business sponsor	Writing the final report	Average across techniques
Take different perspectives	3.3	3.7	4.0	3.9	4.0	4.0	3.5	2.9	3.7	3.7
Decompose the problem	3.5	3.9	3.9	4.3	3.8	3.8	3.1	2.9	4.0	3.7
Create awareness of biases	3.1	3.1	3.7	3.7	3.7	3.9	3.0	2.3	3.7	3.4
Learn about e-commerce	3.7	3.8	3.7	3.9	3.4	3.5	2.9	2.5	4.0	3.5
Build consensus	3.2	3.4	3.6	3.9	3.5	3.7	3.3	2.9	3.8	3.4
Raise the stakes	3.3	3.6	3.7	3.7	3.6	3.9	3.5	2.8	3.7	3.5
Reduce complexity	3.4	3.7	3.5	3.6	3.4	3.4	2.9	2.5	3.3	3.3
Average across strategies	3.3	3.6	3.7	3.9	3.6	3.7	3.2	2.8	3.7	

Student Text Feedback

Students asked about potential changes to the project with the open-ended question had this to say:
- Alice said: *"The class is great overall. I have enjoyed looking at a real business and digging into the impact a website can have on a business. And it is good to think about how a group can influence decisions of a business."*
- Alex suggested: *"I think seeing an example of e-commerce in action would be beneficial. Knowing how an e-commerce site works on the backend and being able to interact with it would be interesting. This could be a dummy site that allows students to simulate buying and selling."*
- Ella said: *"The examples in class were really helpful and made it easier to put the concepts into perspective. I think that continuing to incorporate more diverse examples would make it easier for students to better understand e-commerce"*

Not everyone felt comfortable with their knowledge during the project. For example,
- Alfred said: *"I liked the case study in the chapters, but I still didn't feel like I knew enough to recommend professional solutions for the business."*