SAINT JOSEPH'S UNIVERSITY

INDIANA UNIVERSITY OF PENNSYLVANIA

10 MINUTE TRAINING: DEVELOPING CRITICAL THINKING SKILLS WITH LOGIC GAMES

J. L. SOUZA AND VERONICA PAZ

ABSTRACT

Successful auditors must be adept at evaluating various types of evidence, determining reasonable responses to inquiries, and brainstorming possible means of verifying information. Many students have had limited experience with developing critical reasoning and abstract deduction skills that are necessary to be successful. We describe the use of logic games in undergraduate auditing courses to encourage critical thinking and problem solving as well as to increase student engagement. By using brief, non-accounting related logic games, we introduce these concepts to students in an everyday setting that allows them to continue their development outside the classroom. Survey responses and game results for 30 auditing and AIS students show that student game scores improve and students perceive the logic games help develop their critical thinking abilities. Overall, we believe the logic games are an effective and efficient tool that may be useful in other courses to encourage students to invest more fully into the development of reasoning skills.

LEARNING OBJECTIVES

This training provides opportunities for students to apply and develop critical-thinking, problem-solving, and communication skills in a universal setting. It is vital for students to take the time, both within and outside of class to practice these skills. This approach also teaches students how these skills can be transferable from one subject to another, and encourages them to make connections between various topics, as suggested by Stoner and Milner (2010) and Simon (2015). After using the training activities presented here, students should be able to:

1. Use deductive reasoning to solve structured problems with limited information.
2. Ask probing questions and update assumptions based upon the responses.
3. Brainstorm with teammates regarding approaches to complex questions.

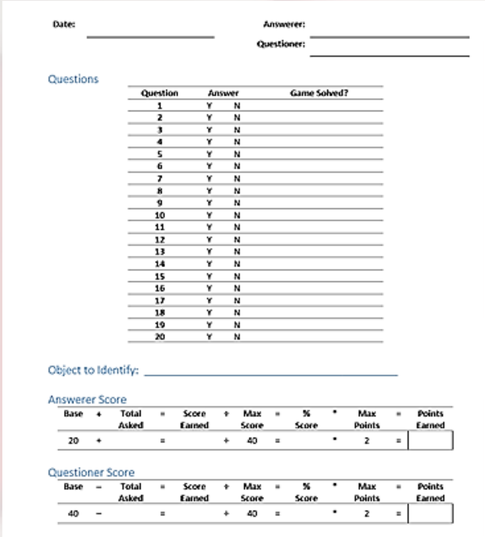
J L Souza ORCID code

LOGIC GAMES

For those that are unfamiliar with playing 20 Questions or would like a reference to provide students, we recommend https://www.wikihow.com/Play-20-Questions. This site provides a simple explanation of the process and strategies for winning the game.

For the other activities, there are many online sites that provide free games. However, many of these sites provide online-only versions. Below are three sites with a variety of printable free games that can be used by instructors in class. They provide an assortment of types of puzzles and levels of complexity to give instructors flexibility.

- https://brainbashers.com/logic.asp
- https://www.puzzlebaron.com/portfolio-category/printable-puzzles/
- http://www.puzzles.com/PuzzlePlayground/NonManipulativePuzzlesHome.htm



Date: _____ Answerer: _____ Questioner: _____

Questions

Question	Answer	Game Solved?
1	Y N	
2	Y N	
3	Y N	
4	Y N	
5	Y N	
6	Y N	
7	Y N	
8	Y N	
9	Y N	
10	Y N	
11	Y N	
12	Y N	
13	Y N	
14	Y N	
15	Y N	
16	Y N	
17	Y N	
18	Y N	
19	Y N	
20	Y N	

Object to Identify: _____

Answerer Score

Base	+	Total Asked	=	Score Earned	÷	Max Score	=	% Score	*	Max Points	=	Points Earned
20	+		=		÷	40	=		*	2	=	

Questioner Score

Base	–	Total Asked	=	Score Earned	÷	Max Score	=	% Score	*	Max Points	=	Points Earned
40	–		=		÷	40	=		*	2	=	

Drop Quotes

Source: Mary Gardiner Brainard — Puzzle #R616FN

		H	O			O																	
W		T	H	U	H	T			I	L		E	E			D		T					
I	I	L	I	N	G	G	O		A	N	H	T	H		I	N	L	R	H				
E	T	W	A	G	L	D	D	R	A	T	O	N	R	E	W	A	A	K	K				

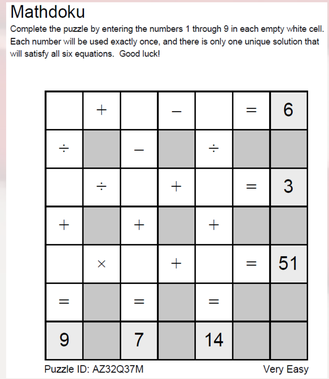
SURVEY

A survey was utilized to collect student feedback on the training activities and their perceptions of the activities.

The survey is a modified version of the Braun and Sellers (2012), the Hess, Haney and MacPhail (2017) and Westermann and Thibodeau (2016) questionnaires.

The surveys were distributed online during the last week of the semester.

Statement
1. I enjoyed the training activities.
2. The training activities were understandable.
3. The training activities helped me understand the need to critical thinking in the accounting profession.
4. I gained experience completing tasks under time pressures.
5. As a result of the training activities, I came to class more prepared to begin learning than I would have.
6. As a result of the training activities, I was better able to answer questions in class than I would have.
7. As a result of the training activities, I improved my ability to critically approach complex problems.
8. As a result of the training activities, I was better able to evaluate information than I had been.
9. As a result of the training activities, I am better able to brainstorm about problem-solving activities.
10. As a result of the training activities, I learned the course material better than I would have otherwise.
11. The use of the training activities has had a positive impact on my approach to other courses.
12. The use of the training activities has had a positive impact on my project and exam grades.



Mathdoku

Complete the puzzle by entering the numbers 1 through 9 in each empty white cell. Each number will be used exactly once, and there is only one unique solution that will satisfy all six equations. Good luck!

	+		–		=	6
÷		–		÷		
	÷		+		=	3
+		+		+		
	×		+		=	51
=		=		=		
9		7		14		

Puzzle ID: AZ32Q37M — Very Easy

REFERENCES

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Hess, David J., Mark H. Haney, and Carol S. MacPhail. 2017. "What You Do Know Can Hurt You: An Instructional Case Requiring Application of Professional Standards to an Ethical Dilemma Facing and Auditor and Tax Preparer." Current Issues in Auditing 11 (1): l1-l9.

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Simon, Jon. 2015. "PowerPoint and Concept Maps: A Great Double Act." Accounting Education: an international journal 24 (2): 146-151.

Westermann, Kimberly D., and Jay C. Thibodeau. 2016. "Extra Credit "Opportunities": A Tool to Motivate Group Interaction in the Classroom." Current Issues in Auditing 10 (2): l1-l13..

CONCLUSIONS

Success in the rapidly-changing auditing profession requires strong critical-thinking, analytical-reasoning, and communication skills as well as the ability to learn new skills and new applications of existing skills. This paper describes the repeated use of logic games to assist students in developing these skills. The training activities take no more than 10 minutes each and do not need to be tied to specific course content. Once completed, students receive immediate feedback on their success and instructors can use the activity to explain the missing steps on the failures. Instructor preparation is minimal and straightforward, allowing instructors to incorporate it into courses in a variety of ways. Overall, we find the flexibility of the training activities provides opportunities to teach students the adaptability of necessary skills. This, in turn, can encourage more self-teaching and improves students' ability to connect material in different classes.

NEXT STEPS

Our initial measures of efficacy involve the survey described above, administered to students after repeated use of the training games. Our next measure of efficacy will rely on CPA-exam situational questions to measure the improvement in students' ability to reason through complex questions. We will use non-audit-related questions to control for improvements based on students' gaining knowledge throughout the semester audit course. With this process, we feel we will be better able to measure students' overall improvement in problem-solving and critical reasoning objectively.

Veronica Paz ORCID Code