

Applying Beer Game in Teaching Bullwhip Effect: Game Board vs. Online

Dr. Mei Cao, School of Business & Economics

University of Wisconsin - Superior

ABSTRACT

Research has been shown the Beer Game simulation provides students with the opportunity to experience real life problems when dealing with the bullwhip situations. However, teaching through the Beer Game requires a time commitment and carefully orchestrated organizational scheme from both the instructor and the students. While online applications have been created to facilitate the inefficient and laborious manual processes of the game board based Beer Game, the project aims to assess which Beer Game simulation, game board or online, helps students to achieve a deeper learning of the course concept as well as provides students with a better learning experience.

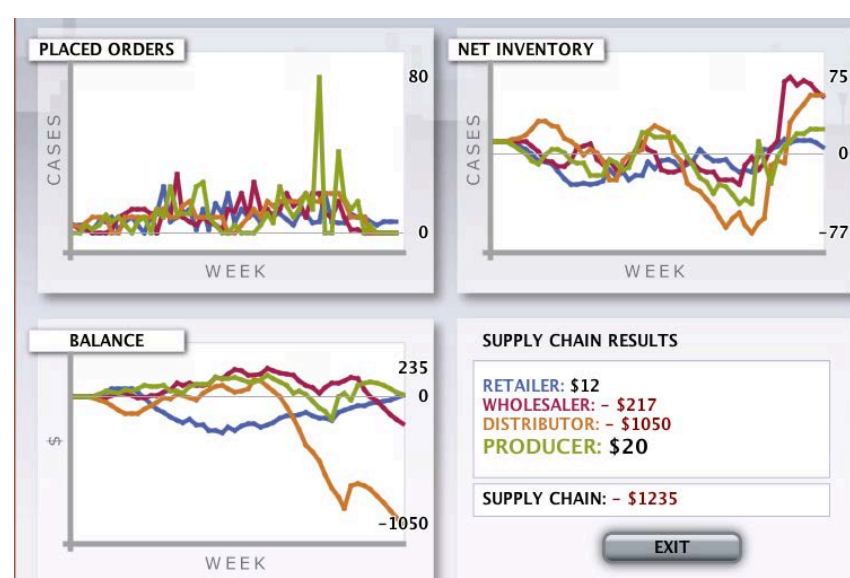
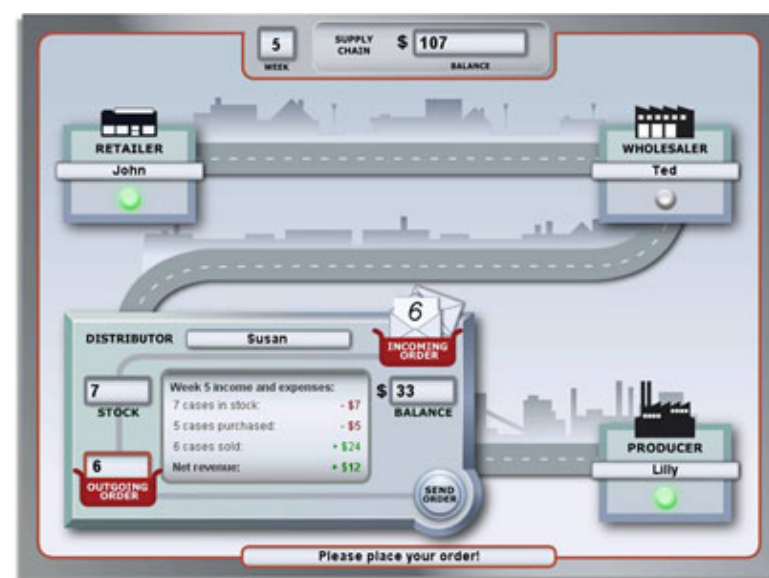
Game Board Based Beer Game

Students use a game board on which they pass order cards and inventory tokens while recording their inventory and back-order levels. When the game is complete, students graph their order quantities and compared costs.



Online Beer Game

Students make decisions on the order quantity for each round of play and enter the quantity into the computer system and all information is stored in real time. When the game is complete, the students automatically get a graph their order quantities and compared costs.



Methods

Participants: Teams were comprised of four sectors in a supply chain: retailer, supplier, distributor and manufacturer, with one student in every sector. Four teams in an online SCM class played the online game (Online Group). Four teams in an on-campus class played on the game board in classroom (Game Board Group). Two teams in the on-campus class volunteered to play on the game board and online (Hybrid Group).

To Assess Student Level of Learning: Each student was asked five questions based on their beer game data.

1. What do you think the retailer's customer demand pattern looked like?
2. What do you observe about the degree of fluctuation in the order quantity and current inventory levels quantity for each role?
3. What do you think contributes to this effect? List and briefly explain three reasons taken from the game.
4. What are the consequences of the effect that you observe in the results?
5. How could you reduce costs in the beer game?

Answers from each student are assessed on a scale of (0 = unsatisfactory, 1 = satisfactory, 2 = more than satisfactory) and scores are averaged by group.

To Assess Student Learning Experience: Each student was asked to rate three statements regarding their beer game experience on a scale of (0 = Disagree, 1 = Agree, 2 = Strongly Agree). Scores are averaged by group.

6. I felt I was controlled by forces in the system from time to time
7. I felt that I was participating in a team exercise.
8. The game was a useful learning experience.

References: Badar, A., Sammidi, S., & Gardner, L. (2013); Ngai, E., Moon, K., Poon, J. (2012); Simchi-Levi, D., Kaminsky, P., & Simchi-Levi, E. (2008).

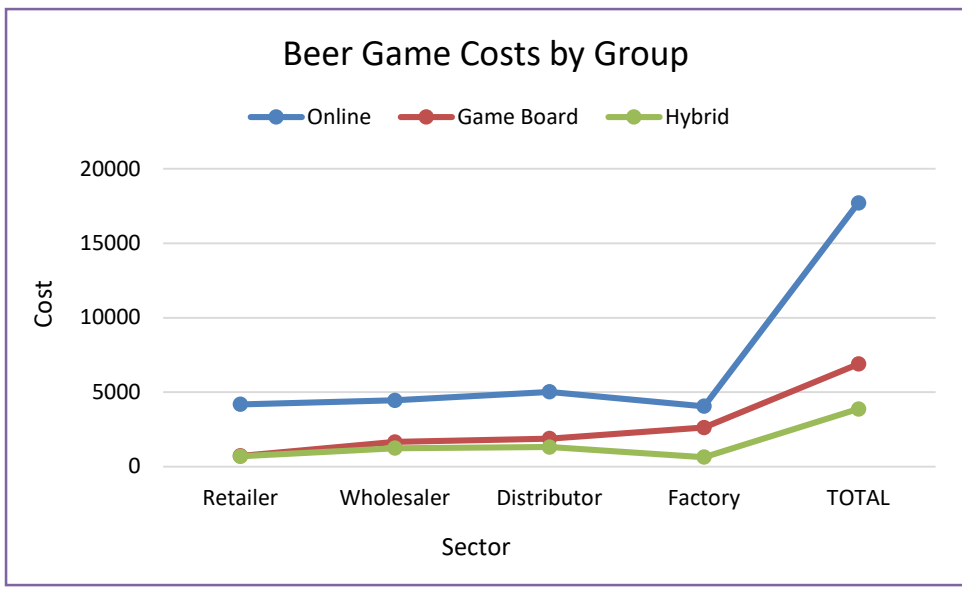
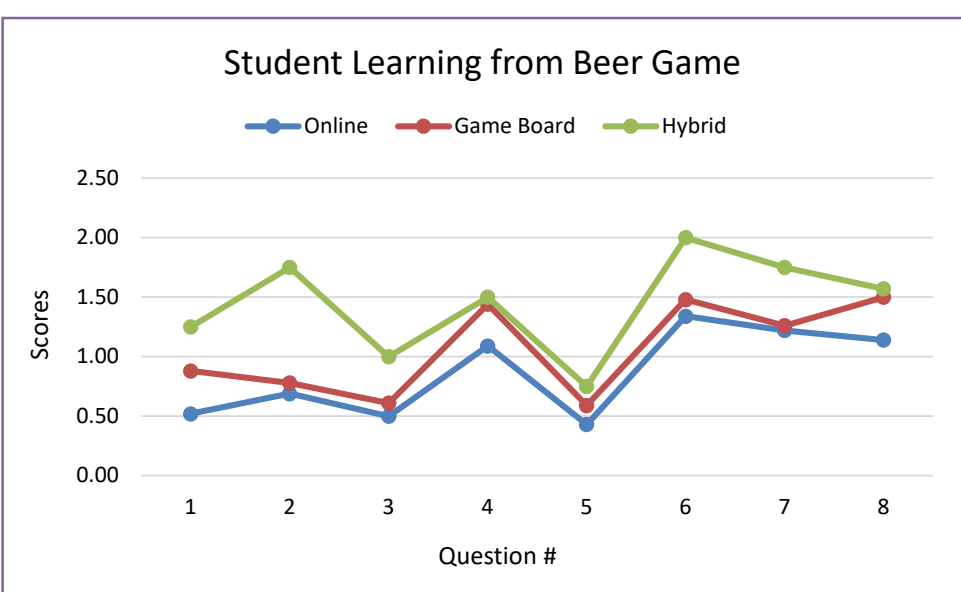
Results

Consistently, the Hybrid Group receives the highest scores on all eight questions, followed by the Game Board group. The Online Group receives the lowest scores.

Group	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Online	0.52	0.69	0.50	1.09	0.43	1.34	1.22	1.14
Game Board	0.88	0.78	0.61	1.44	0.59	1.48	1.26	1.50
Hybrid	1.25	1.75	1.00	1.50	0.75	2.00	1.75	1.57

The Hybrid Group performed the best in each sector with the lowest total cost of 3,869. The Game Board group performed better than the Online Group.

Group	Retailer	Wholesaler	Distributor	Factory	TOTAL
Online	4,186	4,451	5,025	4,052	17,714
Game Board	720	1,654	1,885	2,628	6,887
Hybrid	686	1,240	1,313	630	3,869



Conclusions

Students learn best by playing on the game board and then online. The game-board version is a more valuable learning experience in understanding the bullwhip effect than the online version although it requires more time and carefully orchestrated organization.

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