Strategic Planning, Learning and Company Performance In A Strategic Management Simulation Environment

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ABSRACT

Total enterprise simulation games are an accepted pedagogical technique to create and sustain student engagement in strategic management courses. An important research question is whether students learn to manage companies in a total enterprise simulation. A second important question is whether strategic planning has any effect on company performance in the simulation environment. Our research examined these questions in the context of student team performance in the Business Strategy Game Online® as a research setting for a time-series experimental design. The change in the mean trend of Company Performance before and after the intervention of Strategic Planning shows strong support for a positive effect of strategic planning on company performance. A control group also showed similar but somewhat muted pattern. These results can be interpreted as a manifestation of student learning during the simulation game.

Keywords: Strategic Planning, Business Simulation, Company Performance, Student Learning

INTRODUCTION[1]

Simulations and games have been used in many disciplines, including business, to create and sustain student engagement in learning (Auman, 2011; Misfeldt, 2015; Moseley & Whitton, 2014). In the field of strategic management, three distinct pedagogical tools have been in use, viz., Case Analysis, Total Enterprise Simulation Games (TESGs), and projects in Small Business Consulting. The virtues of TESGs for purposes of teaching, learning and research have been examined for over half a century (Dill, 1963; Faria, 2001). However, student engagement is important to faculty because it is expected to lead to learning. It is an important question for all of them to know whether students learn to manage a company's various aspects through simulations as experiential learning. Those faculty who use TESGs for the teaching of strategic management want to know whether strategic planning helps students in improving their company performance. These are separate but interconnected questions.

Feinstein & Cannon (2002) have argued that simulations have "representational validity", which means simulations do what was intended, and "validity" where conclusions reached by participants are like those obtained from the real world being modeled. Dickenson and Faria (1997) examined the performance of "real" simulation companies versus the performance of a group of companies using random strategies. The real companies outperformed the random strategy companies, and thus they argued, the simulation used was internally valid. Wolfe and Luethge (2003) performed a similar study. They found real players who consciously made decisions outperformed both players who copied the industry leader's decisions and players who simply regurgitated their opening decisions. Thus, we may conclude that (a) well designed simulations exhibit an appropriate level of realism, and (b) purposeful decision-making by students is related to student team performance in the simulation because they beat random decisions, cruise control decisions that never change, or copycat decisions that imitate industry leaders.

Fortmüller (2009) examined the kind of learning that takes place in a simulation game environment. He starts with the two distinct forms of knowledge in cognitive learning theory. Declarative knowledge refers to "knowing about something", while Procedural knowledge refers to "being able to carry out an activity". As an example, most people use grammar rules of their native language without difficulty (due to procedural knowledge), but cannot always define those rules of grammar (due to lack of declarative knowledge). Competence in any professional field requires both kinds of knowledge. He states that there are four learning objectives (LOs) behind the use of experiential learning techniques such as games: (LO1) to be able to use already-acquired specialized knowledge in specific problem situations, (LO2) to be able to combine activities acquired separately to a systematic sequence of action, (LO3) to be able to reconstruct basic correlations and processes, and (LO4) to be able to assess the interactions and consequences of an individual's and others' activities.

[1] The authors gratefully acknowledge the detailed and helpful comments from their anonymous reviewer.

There is a direct correspondence between these LOs and the learning objectives behind using a TESG in a strategic management course. Typical course objectives are (a) learning how to apply knowledge acquired in the business curriculum (declarative knowledge) to the analysis of reports and synthesis of strategies for their company (specific problem situation); (b) learning to make decisions about various aspects of the simulated company to form a coherent pattern (combine activities acquired separately – financial / marketing / production theories, concepts, and analysis – and apply to the game systematically); (c) learning by continually revising their estimates of degree of impact of different variables on their performance (reconstructing basic correlations and processes by which performance can be achieved); and (d) learning about the interactions between, and impact of, their own decisions and competitor decisions on their own results (assessing the interactions and consequences of their own and competitors activities).

Hornaday and Curran (1996) examined the relationship between formal planning and the performance of student teams competing in a comprehensive business simulation. After controlling for the effect of differences in competitive sets and exogenous conditions, statistical testing indicated that planning teams perform significantly better than non-planning teams. Since the planning teams performed strategic planning exercise before starting the simulation, we conclude that the study utilized a Pre-Experimental Static Group Comparison design (Campbell and Stanley, 1963).

METHODOLOGY

We decided to use a Time Series Quasi-Experimental Design to study the effect of formal planning on performance of student teams competing in a comprehensive business simulation. It would be a methodological contribution to the research in this arena.

The Business Strategy Game Online (BSG-Online®) by Thompson, Stappenbeck, et. al. (2004 - 2017) served as the research setting for this study. BSG-Online simulates a global athletic footwear industry with a maximum of twelve companies competing with one another. Student teams are tasked with strategic management of a company. All companies are considered to have been in existence for ten years, and start on an equal footing to compete beginning year 11.

In the game, students plan their operations and strategy, and make and save their decisions prior to deadlines on a preset schedule, when the game program processes decisions from all companies and computes performance of each company for that year. Company and Industry reports are available to students for analysis almost immediately for the next annual cycle. The fifty-three (53) decisions involve most aspects of a manufacturing company including forecasting, production, distribution, marketing, human resources, finance, etc. In addition to annual short-term decisions, students also make capital budgeting and financing decisions with longer term implications for the life of the simulation. Teams begin with decisions for Year 11.

The game administrator has the option to assign a Strategic Planning (SP) exercise where teams systematically go through their strategies and set goals in all areas of performance to create a 3-year strategic plan. This exercise can be assigned in Year 14 or later, i.e. after teams have three years of data on competitor decisions and performance.

There are two types of performance indicators in BSG – the Investor Expectation (IE) score and the Best-In-Industry (BII) score. The IE is a composite indicator on a scale of 0 – 100. It is the sum of scores on five criteria, such as ROE, EPS, Credit Rating, Stock Price, and Image Rating – each weighted equally at 20 points. These five scores are added together to form the composite IE score. A company may achieve a score above 100, up to 120, if it has surpassed the numerical goals on those criteria.

The Best-In-Industry (BII) is the second type of composite performance indicator of comparative performance of each company compared to the best performing company on each criterion in that year. As this is a measure of relative performance, this score was considered unsuitable for examining the effect of strategic planning on the company's performance with respect to goals set by the game, and known to all the company managers.

We used the IE score as an indicator of company performance in each year of the game for three reasons. First, the goals are preset for each of the five criteria at the beginning of the game; second, these goals are same for all

companies; and third, that a company's achievements on the criteria reflect the effectiveness of competitive strategies and internal operations of the company.

Game player subjects were all undergraduate, senior students with Business Majors in accounting, computer information systems, finance, management and marketing. All subjects had, as a prerequisite to the class, completed their Business Core courses prior to enrolling in the capstone class in Strategic Management. Students in each class section were assigned to teams of three to four students each with a view to maximizing the diversity of Majors and gender in every group. Each team was expected to strategically manage a footwear manufacturing company by making decisions for the coming yearly cycle. Class size varied between 25 to 30 students each, therefore all industries consisted of eight companies.

The game provided an excellent setting to test the effect of Strategic Planning (SP) on company performance as measured by Investor Expectation (IE) score. The timing of SP intervention could be adjusted between Year 14 and Year 15 to test if the effect is changed by timing of intervention. There was one semester when three sections – all online – were not assigned any strategic planning exercise due to an error in setting the game decision schedule. This error resulted in a control group of three industries.

The study utilized a Time Series Quasi-experimental design (Campbell and Stanley, 1968) with eight (8) annual IE scores as observations of each company's performance in Year 11 (Y11), Year 12 (Y12) … until Year 18 (Y18). The Strategic Planning exercise (SP) was the intervention. (see Table 1) For one set of industries which we designated as Y14set, SP was required between Y13 and Y14 (i.e. the third and fourth observations) and the strategic plan was to be submitted with Year 14 decisions. For another set of industries which we designated as Y15set, SP was required between Y14 and Y15 and the strategic plan was due with Y15 decisions.

Table 1: Time Series Quasi-Experimental Design for comparing trends before and after the treatment

Y14set: SP in Year 14	IE_{11}	IE_{12}	IE_{13} **SP**	IE_{14}	IE_{15}	IE_{16}	IE_{17}	IE_{18}
Y15set: SP required in Year 15	IE_{11}	IE_{12}	IE_{13}	IE_{14} **SP**	IE_{15}	IE_{16}	IE_{17}	IE_{18}
Control Set (No SP required)	IE_{11}	IE_{12}	IE_{13}	IE_{14}	IE_{15}	IE_{16}	IE_{17}	IE_{18}

Per the Time Series design, if the trend in IE *after* SP intervention is statistically higher from the trend in IE *prior* to SP, then we may conclude that SP has an effect on company performance. From strategic planning literature, we would predict that the trend in IE *after* the SP intervention would be greater than the trend in IE prior to the intervention.

We collected data from capstone Strategic Management classes from Fall 2014 through Spring 2016. In each semester, two sections were conducted in a face-to-face setting, while two sections were conducted online. There were a total of 16 sections or industries with eight teams competing in each industry for a total of 128 companies. All sections were given five weeks to study the game, develop strategies, and two practice year runs to get them familiarized with the mechanics of decision input as well as to test the way the game responds to decisions. Game data for all companies was reset back to Year 10 after the practice runs, and the game ran through 8 cycles, i.e. from Year 11 through Year 18.

For each of the Fall and Spring semesters of academic year 2014-15, the Strategic Planning exercise was scheduled in Y14 for two Online and two Regular (face-to-face) sections. This is the Y14 Set of 8 industries with eight competing teams each. The Y15set consisted of eight industries (with eight competing teams in each industry) from the Fall and Spring semesters of AY 2015-16. Again, there were two Online sections and two Regular sections in each semester. Table 1 provides a summary of these.

Table 2: Industries tabulated by Medium of Instruction, Semester and Strategic Planning Treatment Year

		Y14 Set (AY2014-15)	Y15 Set (AY 2015-16)
Regular Sections	Fall	Industries: 20, 21	Industries: 30, 31
Online Sections	Fall	Industries: 22, 23	Industries: 32, 33
Regular Sections	Spring	Industries: 24, 25	Industries: 34, 35
Online Sections	Spring	Industries: 26, 27	Industries: 36, 37
Total		8 Industries, 64 teams	8 Industries, 64 teams

The data for IE scores for each company is automatically recorded by BSG Online after every run of the game, therefore there is no interaction between subjects and instrumentation. BSG Online also evaluates achievement of each team on strategic plans per preset rules that are known to students when they go through the strategic planning exercise. The rules provide incentives to teams for setting realistic yet high enough goals on the five criteria for performance evaluation. BSG website showed that all teams in the experimental industries completed their strategic plans as required. This was an excellent check that the intervention occurred in all the teams.

Given the data, we can set up research questions, and test hypotheses for (1) the year of treatment, i.e. Y14 treatment vs. Y15 treatment (i.e. irrespective of Medium of Instruction), and (2) controlling for Medium of Instruction, i.e. Y14 Regular sections vs. Y14 Online sections, as well as Y15 Regular sections vs. Y15 Online sections.

Two trends in IE scores were computed for each company for the pre-intervention and post-intervention period. Accordingly, for companies in the Y14 Set, trends were designated as "T11-14" for pre-intervention, and "T14-18" for post-intervention. Similarly, for companies in the Y15 Set, trends were designated "T11-15" and "T15-18". The means of pre- and post- trends were subjected to Paired T-tests using Minitab® for each condition – year of treatment and medium of instruction.

Research Question 1: Is there a positive effect of the Strategic Planning (SP) exercise as an intervention on the performance of teams when the intervention is in year 14?

Ho: There is no significant improvement in the trend of instruction medium scores after the strategic planning exercise in year 14 for companies in industries 20-27.

Table 3: Paired t-test for trends in IE scores of Y14 Set industries before and after the intervention

Trend of IE for Years	Sample Size (Y14 Set)	Sample Mean	Sample Standard Deviation	Standard Error of Mean
T14-18	64	7.29	9.08	1.13
T11-14	64	-6.80	10.75	1.34
Difference	64	14.09	17.79	2.22
95% C.I. for the population mean of the difference between Years 14-18 and Years 11-14 = (10.38, infinity)				
Paired t-test of population mean difference <= 0 versus > 0 t-value = 6.33 p-value = .000				

A paired t-test of hypothesis using companies in industries 20-27 with an intervention year of 14 resulted in a p-value of .000 and rejection of the null hypothesis. We cannot reject the null hypothesis that states there is not a statistically significant change in the instruction medium scores for years 14-18. We are 95% confident the interval (10.38, infinity) contains the true value of the difference between the trend for years 11-14 and the trend for years 14-18.

Research Question 2: Is there a positive effect of the Strategic Planning (SP) exercise as an intervention on the performance of teams when the intervention is in year 15?

Ho: There is no significant improvement in the trend of instruction medium scores after the strategic planning exercise in year 15 for companies in industries 30-37.

Table 4: Paired t-test for trends in IE scores of Y15 Set industries before and after the intervention.

Trend in IE for Years	Sample Size (Y15 Set)	Sample Mean	Sample Standard Deviation	Standard Error of Mean
T15-18	64	-0.185	6.506	0.847
T11-15	64	1.886	7.226	0.941
Difference	64	-2.07	11.74	1.53
95% C.I. for the population mean of the difference between Years 15-18 and Years 11-15 = (-4.63, infinity)				
Paired t-test of population mean difference <= 0 versus > 0 t-value = -1.35 p-value = 0.910				

A paired t-test of hypothesis using companies in industries 30-37 with an intervention year of 15 resulted in a p-value of .910. We cannot reject the null hypothesis that states there is not a statistically significant change in the

instruction medium scores for years 15-18. We are 95% confident the interval (-4.63, infinity) contains the true value of the difference between the trend for years 11-15 and the trend for years 15-18.

Research Question 3: Is there a positive effect of the Strategic Planning (SP) exercise as an intervention on the performance of teams when the intervention is in year 14 and the medium of instruction is face-to-face?

Ho: There is no significant improvement in the trend of instruction medium scores after the strategic planning exercise in year 14 for companies in industries 20-21-24-25 taught in regular sections.

Table 5: Paired t-test for trends in IE scores of Y14 Set industries in face-to-face sections only before and after the intervention.

Trend of IE for Years	Sample Size (Y14 Set)	Sample Mean	Sample Standard Deviation	Standard Error of Mean
T14-18	32	7.65	9.40	1.66
T11-14	32	-4.19	8.64	1.53
Difference	32	11.84	16.04	2.84
95% C.I. for the population mean of the difference between Years 14-18 and Years 11-14 = (7.03, infinity)				
Paired t-test of population mean difference <= 0 versus > 0 t-value = 4.18 p-value = .000				

A paired t-test of hypothesis using companies in industries 20-21-24-25 with an intervention year of 14 resulted in a p-value of .000 and rejection of the null hypothesis. The statistical conclusion states there is a statistically significant change in the instruction medium scores for years 14-18. We are 95% confident the interval (7.03, infinity) contains the true value of the difference between the trend for years 11-14 and the trend for years 14-18.

Research Question 4: Is there a positive effect of the Strategic Planning (SP) exercise as an intervention on the performance of teams when the intervention is in year 15 and the medium of instruction is face-to face?

Ho: There is no significant improvement in the trend of instruction medium scores after the strategic planning exercise in year 15 for companies in industries 30-31-34-35 taught in regular sections.

Table 6: Paired t-test for trends in IE scores of Y15 Set industries in face-to-face sections only before and after the intervention.

Trend of IE for Years	Sample Size (Y15 Set)	Sample Mean	Sample Standard Deviation	Standard Error of Mean
T15-18	32	-0.93	6.57	1.26
T11-15	32	3.0	7.29	1.40
Difference	32	-3.93	11.66	2.24
95% C.I. for the population mean of the difference between Years 15-18 and Years 11-15 = (-7.76, infinity)				
Paired t-test of population mean difference <= 0 versus > 0 t-value = -1.75 p-value = 0.954				

A paired t-test of hypothesis using companies 30-31-34-35 with an intervention year of 15 resulted in a p-value of .954. We cannot reject the null hypothesis that states there is not a statistically significant change in the Investor Expectation scores for years 15-18. We are 95% confident the interval (-7.76, infinity) contains the true value of the difference between the trend for years 11-15 and the trend for years 15-18.

Research Question 5: Is there a positive effect of the Strategic Planning (SP) exercise as an intervention on the performance of teams when the intervention is in year 14 and the medium of instruction is online?

Ho: There is no significant improvement in the trend of instruction medium scores after the strategic planning exercise in year 14 for companies in industries 22-23-26-27 taught in online sections.

Table 7: Paired t-test for trends in IE scores of Y14 Set industries in Online sections only before and after the intervention.

Trend of IE for Years	Sample Size (Y14 Set)	Sample Mean	Sample Standard Deviation	Standard Error of Mean
T14-18	32	6.94	8.88	1.57
T11-14	32	-9.40	12.09	2.14
Difference	32	16.34	19.38	3.43
95% C.I. for the population mean of the difference between Years 14-18 and Years 11-14 = (10.53, infinity)				
Paired t-test of population mean difference <= 0 versus > 0 t-value = 4.77 p-value = .000				

A paired t-test of hypothesis using companies in industries 22-23-26-27 with an intervention year of 14 resulted in a p-value of .000 and rejection of the null hypothesis. The statistical conclusion states there is a statistically significant change in the instruction medium scores for years 14-18. We are 95% confident the interval (10.53, infinity) contains the true value of the difference between the trend for years 11-14 and the trend for years 14-18.

Research Question 6: Is there a positive effect of the Strategic Planning (SP) exercise as an intervention on the performance of teams when the intervention is in year 15 and the medium of instruction is online?

Ho: There is no significant improvement in the trend of instruction medium scores after the strategic planning exercise in year 15 for companies in industries 32-33-36-37 taught in online sections.

Table 8: Paired t-test for trends in IE scores of Y15 Set industries in Online sections only before and after the intervention.

Trend of IE for Years	Sample Size (Y15 Set)	Sample Mean	Sample Standard Deviation	Standard Error of Mean
T15-18	32	0.44	6.49	1.15
T11-15	32	0.94	7.15	1.26
Difference	32	-0.50	11.77	2.08
95% C.I. for the population mean of the difference between Years 15-18 and Years 11-15 = (-4.75, 3.74)				
Paired t-test of population mean difference <= 0 versus > 0 t-value = -0.24 p-value = 0.811				

A paired t-test of hypothesis using companies in industries 32-33-36-37 with an intervention year of 15 resulted in a p-value of .595. We cannot reject the null hypothesis that states there is not a statistically significant change in the instruction medium scores for years 15-18. We are 95% confident the interval (-4.75, infinity) contains the true value of the difference between the trend for years 11-15 and the trend for years 15-18.

Control Group

During the past fourteen years, there was one semester in 2005 when teams were not required to work through a strategic plan. Statistical analysis was performed on these three industries.

Table 9 shows the results of this statistical analysis *as if* year 14 was an intervention year for comparison with the Y14 Set under Research Question 1.

Ho: The population mean of IE Trends after year 14 is less than or equal to the population mean of IE Trends before year 14 without a strategic planning intervention.

Table 9: Paired t-test for trends in IE scores of three Industries using year 14 as an intervention year

Trend of IE for Years	Sample Size (as if Y14 set)	Sample Mean	Sample Standard Deviation	Standard Error of Mean
T14-18	24	1.73	4.83	0.99
T11-14	24	-3.42	8.85	1.81
Difference	24	5.15	10.82	2.21
95% C.I. for the population mean of the difference between Years 14-18 and Years 11-14 = (1.36, infinity)				
Paired t-test of population mean difference <= 0 versus > 0 t-value = 2.33 p-value = .014				

The null hypothesis is rejected since the 95% C.I. for the difference in the population means is (1.36, infinity) and since the p-value for the test of hypothesis is .014. The trend in the IE scores for years 14 thru 18 is statistically greater than the trend in the IE scores for years 11 thru 14 even though there was no strategic plan introduced in year 14.

Comparing the results in table 3 with the results in table 9 shows the strategic plan in year 14 with a greater improvement in the trend for years 14 thru 18 than found in the results with no strategic plan since the 95% C.I. for the table 3 results is (10.38, infinity) and the 95% C.I. for the table 9 results is (1.36, infinity).

Table 10 shows the results of this statistical analysis *as if* year 15 as an intervention year for comparison with Y15 Set under Research Question 2.

Ho: The population mean of IE Trends after year 15 is less than or equal to the population mean of IE Trends before year 15.

Table 10: Paired t-test for trends in IE scores of Industries 21, 22, and 23 using year 15 as an intervention year

Trend in IE for Years	Sample Size (as if Y15 set)	Sample Mean	Sample Standard Deviation	Standard Error of Mean
T15-18	24	1.53	5.40	1.10
T11-15	24	-2.12	7.68	1.57
Difference	24	3.65	9.08	1.85
95% C.I. for the population mean of the difference between Years 15-18 and Years 11-15 = (.47, infinity)				
Paired t-test of population mean difference <= 0 versus > 0 t-value = 1.97 p-value = .031				

This null hypothesis is rejected since the 95% C.I. for the difference in the population means is (.47, infinity) and since the p-value for the test of hypothesis is .031. The trend in the IE scores for years 15 thru 18 is statistically greater than the trend in the IE scores for years 11 thru 15 even though there was no strategic plan introduced in year 15.

Comparing the results in table 4 with the results in table 10 shows the strategic plan in year 15 with LESS improvement in the trend for years 15 thru 18 than found in the results with no strategic plan since the 95% C.I. for the table4 results is (-4.63, infinity) and the 95% C.I. for the table 10 results is (.47, infinity).

DISCUSSION

This research attempted to answer two questions. The first research question is whether students learn to manage companies in a simulation. The second question is whether strategic planning has any effect on company performance in the simulation environment. For purposes of discussion of results, it may be useful to start with the second question.

Per the time-series experimental design, if the trend in the time series of a variable changes after the intervention, one may conclude that there is an effect of the intervention on the variable under observation. When we examine the effect of strategic planning on company performance, the statistical analysis of trends presented in the previous section shows strong support for the assertion that strategic planning exercise is related to improved company performance in the simulation game setting of BSG-Online®. This effect is statistically significant if planning takes place in Year 14, as the null hypotheses were rejected for Research Questions 1, 2, and 5 for the entire Y14 set, as well as for each medium of instruction, whether face-to-face or online.

Support for the effect is weaker if strategic planning takes place in Year 15. Although the null hypothesis under Research Question 2, 4 or 6 could not be rejected, the confidence interval for the mean difference between the slopes is mostly positive (-4.63, infinity), (-4.63, infinity), and (-4.75, 3.74).

There is an interesting difference between the Y14 vs. Y15 sets. For the Y14 set the initial sample mean trend is negative (Y14 set -6.80, Face-to-face subset -4.19, Online subset -9.40), whereas for the Y15 set the initial trend is positive (Y15 set +1.886, Face-to-face subset +3.0, Online subset +0.94). If “Strategic Planning” results in learning

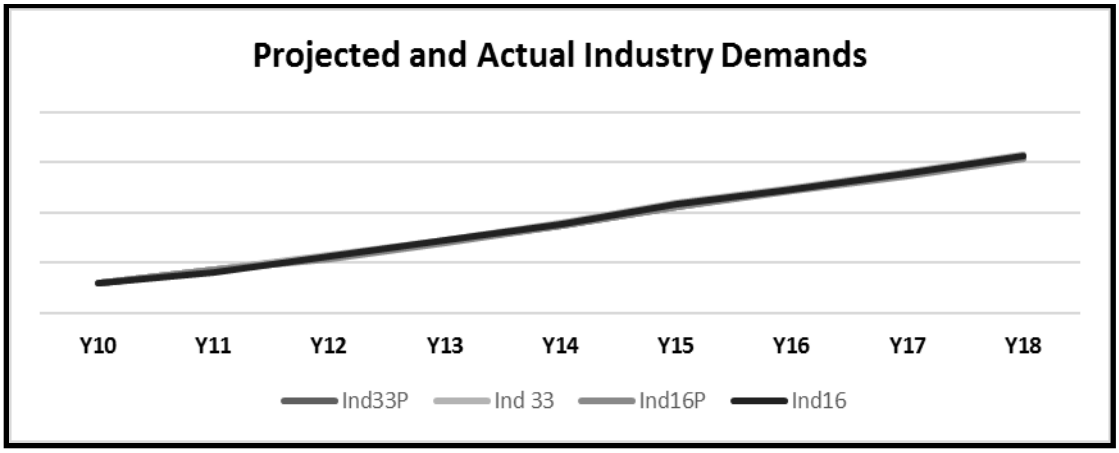
about the company and the industry competitive dynamics, it is possible that the already well-performing student teams increase the intensity of competition in ways that result in declining performance for all the teams in that industry. Recall that there were only eight (8) teams per industry, and Investor Expectation scores could vary only between 0 and 120. If these teams were doing well for the first four cycles of the game, they would already be achieving a high enough mean score. High degree of competition could result in lower achievements as each team incurs significantly more expenses (particularly marketing expenses) and increased break-even levels for production and sales even as the industry may have production capacity well beyond industry demand.

There is a side benefit of this research. Faculty often have questions about equivalency of learning outcomes of students in online classes. This research shows that the Medium of Instruction does not affect the effect of the strategic planning exercise on company performance. There is a similarity in statistical results between Research Questions 3 (Face-to-face, Y14 subset) and 5 (Online, Y14 subset), as well as between Research Questions 4 (Face-to-face, Y15 subset) and 6 (Online, Y15 subset). One possible explanation is that Online students communicate with their team members almost as much and as frequently as students in face-to-face classes. Technology now offers multiple ways of communicating, such as telephone, texting, and video-conferencing. Technology brings team communication in online sections of the course almost on par with communication in regular classes, and levels the field.

Interestingly, the Control Group also showed improvement in team performance before and after Y14 as well as Y15. It must be noted, however, that the control group industries, just like the Y14 set of industries, had a negative initial mean trend in performance, and this held true for "what if" analysis when the data was treated *as if* it had an intervention in Y15. One explanation of this result is that students learn from the concepts presented in the class and apply those concepts to the game to improve performance. This explanation is supported by the fact that students read, discuss and learn concepts of strategy along with the progression of the game. Another explanation could be that the game itself may have something built into it that allows improvement in team performance.

The question is what factors in the design / operation of the game itself would allow teams to perform better after Year 14. Since all other parameters were held constant, the only game artifact that might allow improvement in the performance of teams would be the Industry Demand Curve. If the demand in the industry suddenly started increasing after Y14, at a much higher rate than before, that could explain the improvement in team performance after Y14 because they would face highly benevolent demand conditions. The forecast and actual demands were charted for two industries picked at random (Figure 1). The graphs almost overlap to give an impression of one thick lined graph. They show no abrupt changes in the rate of increase of the demand. Therefore, it may be safely concluded that no game artifact affects the performance of teams.

Figure 1: Graphs of Forecast and Actual Industry Demand in two industries



These intriguing results about the effect of strategic planning on performance are directly related to the question whether team performance indicates any learning on the part of students and student teams. Some may argue that the effect of strategic planning on performance is questionable because (1) the control group shows improvement in performance, just as the Y14 set, which may be construed as due to "maturation" which is one of the artifacts

pointed out by Campbell and Stanley (1963), and (2) results for Y15 set may be construed as movement towards central tendency, again due to "maturation" rather than due to any effect of strategic planning on performance. The question then is what exactly does the process of "maturation" denote? Maturation certainly does not have anything to do with any physical changes in the students over a period of a semester. The only answer is that the "maturation" represents "learning" on the part of students along the four Learning Objectives (LOs) we mentioned in the introduction.

Since the control group showed an improvement in performance, with all three industries in Online medium of instruction and without a strategic planning intervention, the least that we may conclude is that students learn how to manage a company in a business simulation environment. The support for a positive effect of strategic planning on company performance, and the somewhat larger magnitude of effect in the experimental Y14 set, would indicate that a systematic strategic planning exercise facilitates learning about strategically managing a company.

For future research, there can be another way to examine the effect of strategic planning on performance of student teams by comparing their performance against the goals they set for the three plan years in their strategic plans. This approach would show light on the efficacy of strategic planning in directly producing desired performance as well.

REFERENCES

Auman, C. (2011). Using simulation games to increase student and instructor engagement. College Teaching, 59(4), 154-161.

Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research*. Chicago: Rand McNally.

Dickenson, J. & Faria, A. J. (1997). The random-strategy criterion for validity of simulation game participation.

Dill, William R. and Neil Doppelt (1963). The Acquisition of Experience in a Complex Management Game *Management Science*, Vol. 10, No. 1, (Oct 1963), pp. 30-46.

Faria, A.J. (2001). The changing nature of business simulation / gaming research: A brief history, *Simulation & Gaming*, Vol. 32 No. 1, March 2001 97-110.

Feinstein, A. H., & Cannon, H. M. (2002). Constructs of simulation evaluation. *Simulation & Gaming*, *32*, 425-440.

Fortmüller, Richard (2009) Learning Through Business Games: Acquiring Competences Within Virtual Realities, Simulation & Gaming, Vol 40, No. 1, pp 68-83.

Hornaday, Robert W. and Kent E. Curran. (1996) Formal Planning and the Performance of Business Simulation Teams. *Simulation & Gaming* (27) pp 206-212.

Misfeldt, M. (2015). Scenario based education as a framework for understanding students' engagement and learning in a project management simulation game. Electronic Journal of E-Learning, 13(3), 181.

Moseley, A., & Whitton, N. (2014). Engagement in Simulation/Gaming: Symposium overview. Simulation & Gaming, 45(4-5), 428-432.

Wolfe, J., & Luethge, D. J. (2003). The impact of involvement on performance in business simulations: An examination of Goosen's "know little" decision making thesis. *Journal of Education for Business*, 69-74.