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ACHIEVING BUSINESS PROCESS ORIENTATION USING ERP SIMULATION GAME

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Abstract:

Sophistication of the integrated world of work and increased recognition of business processes as critical corporate assets, require graduates and employees to develop 'process orientation'. Responding to these dynamic changes in business organizations, business schools are also continuing to modify their curriculum and introducing innovative teaching and learning strategies. ERP business simulation game is one such initiative that helps in understanding the business processes and in developing process orientation among business graduates. This paper is a part of a large research project that investigates influence of this simulation game on learning effectiveness, skills development, decision making and dynamics of group working. This paper reports on the impact of deploying an ERP simulation game as a teaching and learning tool on the students' ability to develop process orientation and analyses their generic attitudes towards the learning of SAP through this game. Results reveal the significant impact this game had on their abilities and points out the challenges in the process and pedagogy. Study found that the game contributed to deep learning in addition to resulting in significant improvement in their process orientation and integrative skills. The paper recommends further changes to the deployment and design of the game.

Keywords: Process orientation, SAP skills, simulation game, pedagogy

I. INTRODUCTION

Understanding the concepts of cross-functional business processes and their management are key graduate requirements today in process-centric organizations. Led by practitioners, business process management and process orientation, it is difficult to teach them using traditional teaching and learning methods such as lecture, especially to those postgraduate students in business who have limited or no business experience. Enterprise Resource Planning (ERP) systems and the industry-standard ERP software solutions are considered a powerful tool for teaching these concepts. With strong encouragement and support from leading ERP software vendors such as SAP, Oracle, Microsoft and others, several university business schools have incorporated them into their curriculum. While these initiatives have helped immensely in teaching these concepts and imparting the much needed SAP and other software skills to students, the pedagogical benefits are limited. Need to improve the pedagogy by introducing innovative teaching and learning models is considered necessary in order to improve the learning effectiveness and deep learning of these skills and concepts.

ERP simulation game is one such initiative that exposes students to an authentic learning experience in a simulated, yet complex business environment and expected to offer an exciting and stimulated learning environment (Leger 2006). By exposing students who typically specialize in one discipline and have limited or no understanding of business operations and practical experience to industry-standard ERP software, this game is expected to impart necessary business process orientation and retainable SAP skills to business students in a dynamic and stimulated learning environment. This paper reports on the effectiveness of that initiative and discusses the challenges and opportunities. It will first present a review of literature on business process orientation in business courses and background to the ERP simulation game. It will then explain the initiative undertaken by an Australian university and the methodology adopted in

conducting this evaluation research. It will present the findings of this study and discuss implications and challenges.

II. LITERATURE REVIEW

The Business processes are now considered key corporate assets. Organizations of all sizes have achieved and are still achieving significant improvements in quality, cost, speed and profitability by focusing on modeling, measuring and redesigning their customer facing and internal processes (Hammer 2007). The concept of 'process orientation' is almost a decade old, most of the literature on process orientation has been only in the popular press and industry reports and lacks empirical research focus [McCormack & Johnson, 2001]. It refers basically to the awareness of the interdependencies and information sharing between various functional units and business models, with an underlying focus on integration, customer and customer needs. Violating the functional specialization, the classic management principle, 'business process orientation' may help understand better the perspectives taken by other functions, develop a collective sense of belonging and facilitate the reduction of cross-functional conflicts [Huang and Newell, 2003; McCormack & Johnson, 2001]. Even though it is considered important skill for graduates, acquiring this skill is not a one step activity and is an ongoing process. In addition to basic understanding and appreciation of the concepts, it requires a high degree of self-awareness, critical thinking and deep learning (Quinn et al 2003). In addition to helping graduates in their work environment later on, pedagogically this process orientation is expected to improve understanding of intersections and interactions of traditional disciplines such as marketing, operations, accounting and human resources [McCormack & Johnson, 2001; Burrack & McKenzie, 2005; Kohlbacher, 2009].

The existing pedagogical model of business education embeds functional structure and continues to produce graduates with good technical specialist skills and knowledge in functional areas such as accounting, marketing, logistics, finance and human resources [Cecez-Kecmanovic et al, 2002; Karpin 1995]. Increasing class sizes, limited availability of resources, diversity of students and changing student demographics are placing demands on higher education to explore new pedagogies. In addition to these, business schools are facing dual challenges – one to make their courses relevant by incorporating industry-relevant skills and knowledge, and two to design and implement innovative learning methods and pedagogy [Mortais & Hoff, 2006]. ERP simulation game is one initiative that can help the academics deal with both the challenges simultaneously and successfully. Simulation game is one of the most powerful tools in learning because of their potential to provide real-world business environment and its engaging active learning experience [Moratis et al, 2006; Westernberger, 1999]. Though most of the simulation games predominantly focused on functional concepts and limited and taught in the context of one function (such as logistics, marketing, international business, strategy, IS development etc.), ERP simulation game, designed by HEC Montreal, will focus on the business processes and managing the processes employing much needed multi-disciplinary perspectives.

Earlier attempts at incorporating SAP and other ERP software skills in the course involved regular lectures and lab sessions. Typically concepts of business processes, enterprise systems (ERPs), implementation options and challenges, technologies behind these systems are taught using traditional lecture mode. SAP software skills are taught using a lab sessions where lecturer carries out demos and students required to perform several activities. Students are trained to do various activities in SAP including creation of master data, performing transaction cycles that take students through various application modules such as sales and distribution, production, materials management, accounting etc., and configuration. While these attempts achieved some benefits and learning outcomes in terms of SAP skills and understanding of the enterprise systems concepts, its pedagogical effectiveness and the accomplishing 'deep learning' outcomes are limited. In fact, understanding and appreciating business process perspective was reported as a major challenge and is relatively ineffective [Seethamraju, 2007].

It was difficult for students to understand the cross-functional perspective of business processes in SAP and information flows behind the transactions they are routinely performing [Cannon et al, 2004]. In fact, some students rated this experience as 'routine data entry exercise' and did not seem to have delivered deep learning opportunities [Seethamraju, 2007]. Students, however, feel good that they were exposed to an industry-standard ERP software solution such as SAP, during the course. Learning SAP software skills with hands-on work on the industry-standard software was considered a better learning experience than a routine theoretical teaching of ERP systems [Hawking et al 2004]. Their ability to develop a deeper learning objective, i.e., business process orientation and the appreciation of interdependencies, and its potential to internalize that understanding in their managerial decision making and thinking processes was limited. Some of the reasons identified in the past studies include the resource intensive nature of such courses, individual working on processes and transaction cycles, complexity of the software resulting in an overwhelming experience, undue focus on completing transactions without allowing them to explore the underlying issues [Seethamraju, 2007; Hawking et al, 2004] In addition, complexity of the system makes it hard for students to understand the links between information, business processes, and managerial decisions and distinguish between the limitations of the software functionality and the key managerial requirements.

The knowledge of business management, characterized by its relatively ill-structured and complex knowledge domains requires interdisciplinary focus and is difficult to teach using traditional methods. Simulation using enterprise systems software solutions is expected to facilitate understanding of business processes and impart valuable skills in using industry-standard software solutions such as SAP [Draaijer & Schenk, 2004; Leger, 2006]. Simulations can reduce the complexity of early experiences with business processes, (and hence cognitive load), allowing students to develop process orientation and in the development of software skills. Even in real businesses, execution as learning will deliver better business performance rather than mere flawless execution [Edmondson 2008] and simulation games with learning in an unthreatened environment will deliver that learning as students are executing and managing several business processes. Even though computer based simulation games have become a popular pedagogical tools, research is only beginning to consider how these simulation games impact learning outcomes [Anderson et al, 2005; Seethamraju, 2008].

The ERPSim - a simulation game, originally designed by a team of academics in HEC Montreal and implemented by about 20 leading business schools in the world so far is a team based game with each team operating a firm. Each team will interact with customers and suppliers by sending and receiving orders, delivering their products, determining pricing strategy, cash flows, credit management, using business intelligence and reporting in successive quarters and completing the cash-to-cash cycles. The game relies on the information, transactions and reports provided by SAP, an industry-standard enterprise resource planning (ERP) system. ERP simulation game offers students the opportunity to reflect, to test and find out what works and what doesn't, and gain insight into the business processes, information systems, business strategy, managerial decision making, analytics and team dynamics. This game provides students with process guidelines and tools that enable real-time collaboration and collection of process data and incorporates disciplined reflection, a key requirements to deep learning.

III. RESEARCH METHODOLOGY

Learning objectives

The key learning objectives of introducing this ERP simulation game into a course titled 'Business Process Integration' are i) To develop business process orientation, ii) to teach ERP and SAP skills, iii) to provide business students with an authentic and exciting student-centered learning experience that is integrative and motivates them to learn. In addition, the aim is to offer students a quality information-rich environment in which graduates typically work in groups and make day-to-day managerial decisions. Importantly, the aim is to encourage effective skill development, a

sense of enjoyment in learning and embed process orientation in their thinking and managerial decision making. This ERP simulation game is explained in details in Leger (2006) where it explains the details of the ERP Simulation game and its treatment as implemented by the HEC Montreal. This research study employs a modified model where students are exposed to six sessions as against the Leger [2006) model of the game. Details of the treatment employed for this study at the University of Sydney is explained below.

The game is scheduled for six sessions of 3 hours each during the semester. There are eight teams in the class with each team having 5 to 6 students (a total of 52 students in class). This game can be played differently using different sequences and by choosing to automate some processes. In the first three sessions, traditional teaching methods such as lecture and case studies are used to introduce students to the concepts of enterprise systems, business processes, information flows, implementation risks and technologies. From week 4 onwards students are introduced to the game in a step by step manner for another 3 weeks. Students are first introduced to SAP in a generic environment and wherein they perform activities such as i) creation of master data for work centers, vendors, Bill of Materials, customers and materials, ii) carrying out procure to pay and order to cash transactions that include accounts payable, procurement/materials management, sales and distribution, accounts receivable and general ledger components of the SAP. Subsequently, students are exposed to the game where most of the business transactions that involve procurement, selling and accounting were completely automated.

Employing adult learning principles, the program is designed to take students from 'known to unknown'. With a focus initially on the sales process, this game moves on to production and then on to other strategic issues such as marketing strategy, product design, capacity expansions and cash flow management. The game organizers (academics) will first run all the eight teams for the first two quarters by carrying out initial financial transactions automatically and by creating initial stocks of 100,000 units to start the selling process in quarter 2. Thus, in week 7, students are exposed to the cash-to-cash business process cycle through explanation and demonstration of basic SAP transactions and by playing the game for 4 quarters. During this period, each team is required to make business decisions on pricing based on the real-time business intelligence and reporting functionality in SAP. In addition to the HEC Montreal Simulation manual, students are given a one page 'job-aid' that explains the transactions they are required to carry out and the reports they need to check for making pricing decision with the objective of maximizing their profit. Teams will play the game for one quarter in which they vary the price and understand the price and demand sensitivity of the market and learn to read various reports. Typically by the time third quarter is completed, teams will face a stock out situation having sold all their stocks. At this point, a pause is given and students are given an explanation and demonstration of the various steps in the production process. At the end of the second quarter, simulator publishes overall financial performance of all the companies. Teams will then realize the stock-out situation and start producing for the third quarter. They will then do the demand forecasting, carry out MRP run, convert purchase requisitions into purchase orders, and convert planned orders into confirmed production orders. With appropriate time lags built in the system, and considering the production schedules proposed by the teams and capacities, finished goods stock is built for selling in the subsequent quarters.

In the eighth week, initial financing of the companies are carried out by the administrators and all teams start with initial cash to buy raw materials for production and to incur other direct and indirect expenses. In addition, they have the capability to change the product design and pricing and develop niche markets for their companies, suggest process improvements through setup time reduction, do loan repayments and plan marketing/advertisement strategies/expenses. The game then continues for another four quarters in week 9 with students continuously evaluating their strategy after every quarter. At the end of every quarter, quarterly financial statements and performance results of each team are displayed to students. During this process, teams will be continuously checking their stocks, average price of the products in the market place, production schedules, financial statements, costing and other reports. A debriefing session is conducted at

the end of the session wherein students are asked to discuss the decisions they have made and give reasons, the consequences and the role of information and integrated nature of business to the class. In week 10 and 11, a competitive business game is played wherein students are assessed based on their performance in the game, their logical explanation of the results and justification of their decisions, and importantly on their ability to establish and explain the links between their decisions, the results and the learning value. In addition, each team is asked to reflect on their team's performance and working in terms of their working strategy, organization of the work, communication/collaboration methods and techniques they have employed and the effect those strategies potentially have on their performance.

Data Collection

Data was collected twice – before and after the experience with the help of a questionnaire designed for this study. The questionnaire consisted of some basic demographic details such as gender, course they are currently enrolled in (IT or business related), whether they have any previous experience or not, and whether they have any previous knowledge/experience of working with SAP.

In the second section, students were asked to make a self-assessment of their knowledge on specific dimensions/concepts and the competence gained before and after this game using a 7-point Likert scale (1 = very low, 7 = very high). This questionnaire was administered before the introduction of the game to the student in week 3 and again in week 12 when they have successfully completed their game based assessment task. The statements in the questionnaire are developed taking into consideration the learning objectives of the game. The following table gives the definition of the constructs/dimensions.

Table 1: Definition of the specific constructs/dimensions that measure self-assessed knowledge

Knowledge dimensions/ constructs	No. of items	Definition
Process concepts & terminology (BCT)	9	Refers to the knowledge/understanding of the basic concepts of process, its terminology and the underlying aspects such as integration, standardization, customer centric nature, interdependencies, and terminology that relate to various functions - sales, production, procurement & accounting
Process Significance & Awareness (PSA)	13	Refers to the understanding of the significance of process, and awareness of issues that deal with broader perspective, inter-dependencies, integrated processes, information visibility, information flows; and consequences of sub-optimization of tasks in process and customer focus.
Process Management & Analysis (PMA)	10	Refers to the understanding and ability to analyze the information/reports in managing the processes – includes analyzing reports, cause-effect relationships, monitoring performance, links between strategy and process outcomes, information quality and significance of communication and collaboration.
SAP Skills (SAP)	8	Software skills - ability to carry out basic SAP transactions including creation of master data, transaction cycles in planning, production, procurement, sales and accounting processes; and interpreting the information on SAP screens and analyzing the links between transactions, master data, reports and functionality of the software in the game
Total	40	

The questionnaire includes questions that measure 'business process orientation' developed through this game signifying the underlying concepts such as standardization, integration, customer centric nature, interdependencies, information flows, collaboration, communication, broader perspectives and effects of individual tasks. In addition, series of questions that are designed to measure the perceived SAP skills such as master data creation, transactions, production of reports, analysis and interpretation of reports and data, functionality of the system etc. are also included in this section.

As shown in table 1, all the 40 variables employed to collect data in this section are grouped into four factors – Process concepts & terminology, Process Significance & Awareness, Process Management & Analysis and SAP Skills. This section is administered twice – once in week 3 before students are exposed to the game and once in week 12 after students have played the game and completed the related assessment task.

In the third section, students are asked to give their perceptions and attitudes towards the simulation game, its delivery, organization and its generic benefits to them. Sixteen variables are grouped into four headings – delivery (5), learning environment (2), organization of work (3) and benefits at workplace (6). The objective is to measure the perception of students on the benefits this game has realized, the way the game was administered, the learning value delivered by the game, and their views on the successful organization of work among members while playing the game. This section includes questions such as: "simulation game helped me in the implementation of ES in future, game made me more confident about how I must contribute to successful implementation, this game helped me understand how an ES can improve the business operations, whether learning through this game is more exciting than traditional teaching, whether organizing tasks according to function or process is the secret of their success", etc. This section is administered after students are exposed to the game.

Table 2: Participants perception of the Game - Definition of the constructs

Knowledge dimensions/ constructs	No. of items	Definition
Administration	5	Refers to the way game is administered and deals with the pace of the game, debriefing session, value added by the academic and basics taught before the game
Benefits	6	Refers to the perceived potential benefits at the workplace after playing the game and includes help in ES implementation, better understanding of the role of SAP in business, and dealing with exceptions in processes, overcome frustrations with existing processes enabled by ERP system.
Organization	3	Refers to the perception of the way the work is organized while playing the game
Environment	4	Refers to their perception of the learning environment in which they played the game – includes stimulating and exciting, interesting
Total	18	

In the fourth section, participants were asked to mention the best aspects of the game, challenging aspects of the game and other comments including suggestions for improvement of the delivery and administration of the game.

IV. ANALYSIS, DISCUSSION AND IMPLICATIONS

Demographics

Out of the 50 valid responses received (from 52 total participants in the course), 60% of the respondents to the survey are male and 40% were female, 42% of the students are local students and the remaining 58% of the students are international students. Even though this subject was offered by the Business school, 24% of the students enrolled in this course came from the School of Information technology/computer science and the remaining 76% came from the business school. Business experience and previous knowledge/understanding of SAP are potentially independent variables influencing the knowledge they already have before enrolling in this course. Therefore, data on the previous work experience was collected. On the employment indicator, data revealed that 69% of the respondents have previous work experience and 35% are currently employed. Though 31% of the respondents have reported some previous knowledge of SAP, just 4% of the total students had any serious exposure to SAP system. It appears the remaining respondents (from 31% that claimed to possess previous knowledge of SAP) have just reported seeing SAP screens before in their organizations and no real experience of working with transactions. That way, the participant population is fairly uniform with practically no significant previous knowledge of SAP. The effect of previous knowledge and experience of working with SAP on their ability to participate in the ERPsim game and achieve learning outcomes can therefore be considered negligible and the potential gain in their knowledge can be attributed to the simulation game.

General reliability and validity of the variables are tested for their psychometric properties. The Cronbach alpha for all the constructs is more than 0.8. All the correlations (Pearson's r) among the factors and the overall construct (summative score of the instrument) were observed to be significant at $p < 0.01$ level (2-tailed). The reliability scores for each of the factors and the overall instrument were also good and more than 0.78. The analysis thus confirmed the sound psychometric properties of the data collection instrument in terms of its validity and reliability.

Impact of ERPsim Game on Students' Ability

The difference between the perceived gain in their ability (knowledge and skills) before participating in the game and after the groups played game were computed and used for analysis. This difference was considered a measure of the level of knowledge and skills gained by the students as perceived by them from the game. In addition, total indices for various hypothesized constructs were computed using responses for individual items. Considering that the maximum possible gain in their ability level was 4 (1 before enrolling in this unit, and 5 after completion of this unit), some improvement in their ability was observed across various dimensions. Paired samples t-tests comparing the values 'before' and 'after' as reported by the participants showed that there is a significant gain in the knowledge and ability across various variables as shown in the table 2.

Analysis of the data as shown in table 2 suggests that the game has achieved its objectives of imparting process orientation as well as basic SAP skills. Particularly, there is an improvement in the understanding of the Process concepts and Process significance and SAP skills and much less on their ability to manage and analyze the processes.

Table 2. Impact of ERPSim game on their Abilities – t test values

Variable – Perceived gain in the Understanding and/or skills	t-value	Significance	Std. Dev.	Mean
Process concepts & terminology (BCT)	9.56	0.000	0.78	3.40
Process Significance & Awareness (PSA)	12.56	0.000	1.07	2.90
Process Management & Analysis (PMA)	11.10	0.010	1.24	1.54

SAP Skills (SAP)	6.45	0.000	1.01	3.22
Overall improvement in ability	12.50	0.000	1.02	3.8

As indicated in the above table, participants reported statistically significant improvements in their abilities. Particularly, it is high for process concepts, and SAP skills, while it is relatively less for Process management and analysis (PMA) and process significance & awareness (PSA) factors. With participants reporting improvement in their business process orientation (typically explained by the first three constructs – concepts, significance/awareness and management/analysis), the objectives of using ERP simulation game are achieved. High standard deviation, though suggests further investigation into the factors that would influence this.

Attitude Towards ERPSim Game

Students were asked to give their views on the ERPSim game after they have played it and completed the related assessment. They In addition to their knowledge, students are asked to rate in a scale of 1 (strongly disagree) to 5 (strongly agree), their general attitude towards the simulation game with reference to various aspects. These twelve items deal with the learning value, integration and group working concepts. Participants are asked to rate their perception of the learning value derived from this simulation game – whether learning through simulation game is exciting, interesting and innovative than traditional teaching methods. Similarly, participants are asked to rate whether this simulation game helped them in their understanding and appreciation of the concepts of integrated information, integrated processes, importance of inter-dependencies between various functions, importance of accurate and current transactional data and information flows across various functions. In addition, students are also asked to rate how this game helped them in understanding the importance of coordination and communication between various functional managers and organization of the tasks while playing the game. A summary of participants' attitude towards the ERP Simulation game is shown in table 3.

Table 3. Attitude towards ERP Simulation game

	Attitude of participants towards the game	Mean	Std. deviation
1	Administration (5)	3.19	0.98
2	Benefits (6)	3.97	1.01
3	Organization (3)	3.36	0.97
4	Environment (4)	4.11	1.12
	Overall perception/attitude	3.87	1.12

As shown in the above table, all the variables are rated good (above 3.0) and the overall attitude towards the game is positive (average close to 4.00). Response to individual factors, however range from 3.19 (administration) to 4.11 (environment). Confirming that the game is pedagogically effective, an overall rating of 3.87 is recorded. Comparing with the ratings of other courses on enterprise systems offered previously where the overall rating was 3.2, this demonstrates a significant improvement. The findings suggest that the participants suggested improvements in the way game is administered and are able to appreciate the potential benefits of developing process orientation, and particularly recognized the innovative exciting way of teaching and learning enabled by the ERP simulation game. Thus, process understanding enabled by an ERP simulation game is recognized and appreciated by the participants, reinforcing the pedagogical effectiveness of this game.

Best Aspects of the Game

In order to capture the overall perception on the entire experience, participants were asked to identify the best and challenging aspects of participating in this game and asked to make comments on the game in general. Content analysis of the feedback reveals a generally positive response on the learning experience. These comments are grouped into four themes - pedagogical issues, SAP learning, business process knowledge and graduate attributes.

On pedagogical aspects, participants rated this as one of the most motivating methods of teaching and learning used in this university. As pointed out by one participant, "I have never ever noticed how the time was moving; it was so interesting and exciting. In addition to inspiring learning to students". Competition encouraged teams to actively participate in the game, unlike other group assignments where some group members do not actively contribute.

On the SAP learning, participants felt that this has given them hands-on understanding of the concepts underlying enterprise systems. Even though it involves learning and using SAP, the focus is heavily on processes and their management. Rather than focusing on how to use SAP on a day-to-day basis as a technology/tool like in several initiatives in the past that incorporate SAP and other software tools in teaching and learning, this approach keeps the SAP in the background. As noted by one respondent, "the information technology here focused more on the process rather than on SAP, the best way to learn IT."

This initiative helped students think about business strategies in various functional areas such as marketing, production and finance, and helped them understand their interdependencies. As noted by one respondent, "I had a vague understanding of the process concepts, financials and SAP before the game, and often I just memorized the points and tried unsuccessfully to connect with real-life examples using text books, articles and others. This game greatly filled that gap in my understanding and helped me bridge the gap between theory and practice."

In addition, this game also helped students develop some generic graduate attributes such as group working skills, sense of responsibility and control. As pointed out by one participant, "importantly, we have learnt the importance of cooperation and how to cooperate which is going to benefit us in our further career." This has given students a sense of responsibility and control over various tasks each member performed in the team and helped them develop mutual trust and confidence. As noted by one student, "the way other members trusted me and my judgment, made me feel more confident than ever before."

Participants appreciated the learning value of the game and reportedly gained more significant skills and knowledge than from previous teaching methods. Participants in general felt that the game is 'fun', exciting and inspired learning with a focus on processes rather than IT, and assisted them appreciate cross-functional issues and interdependencies. Thus, this game not only contributed to learning of SAP, process orientation as well as generic graduate attributes in an exciting and interesting way.

Challenges and improvements

In addition to the positive comments about the game, students offered feedback on the challenges as perceived by them. These anecdotal comments are analyzed and grouped into four themes – SAP/technical skills, soft skills, subject knowledge and administration of the game.

Some respondents found it challenging to work in groups because of the diversity of their backgrounds, differences in their motivation to win and varying levels of their business knowledge. As pointed out by one respondent, "organizing tasks among members become challenging for us as we are from different backgrounds." Motivation of individual team members also played a role and noted by one respondent, "not everyone in our team cares as much as I do." Communication and making consensus decisions is also a challenge for some teams and have a detrimental effect on performance. As observed by one respondent, the wrong and repeated request, sometimes resulted in more production and wasted effort." Making quick decisions in the given time frame with so much information is a challenge.

Lack of business knowledge appeared to have hampered the performance of some teams as the game is played mostly from business perspective and not everyone has a good understanding of all the business functions. This appears to be particularly difficult for students from IT background. Respondents found it difficult to develop appropriate business strategies and make appropriate business decisions based on the interpretation of information and reports. As the game is dynamic in nature, many participants found it hard to work in a real-world like scenario. As pointed out by one respondent, "it is hard to know if we made a bad decision or other groups had made better decisions, and ...is truly reflecting the real world situation and it was not easy." Similarly interpreting the "sales data, knowing when to modify the recipe, knowing when to change the price, how much to produce, controlling the costs to make profit, responding quickly to changes in the market... etc. all are challenges."

Even though it is not meant to be a challenge and the game is designed with very limited number of manual transactions, some participants found SAP challenging. General level of complexity of SAP, its screens and user interface, insufficient understanding of SAP transactions and functionality are some of the challenges. Some participants felt that they did not "get enough technical practice and training" and "do not know which processes to use and which processes are automated." As pointed out by one participant, "entire team is required to execute an entire business process chain that involves procurement, production, sales, marketing, and accounting and every team member need to understand the business process across different business functions."

On the administration of the game, participants felt that the explanation must be slower at the beginning and must be in detail linking the reports, information and processes. Inability of the students to practice the simulation game after the class also contributed to the challenges. In addition, unknown factors in the game though similar to a real-world business scenario, posed difficulties for some teams. Combining SAP software functionality, theoretical knowledge of business processes and strategies, and reports made it difficult for many teams. As noted by one respondent, "we don't know what our customers like, how high the price can be when we are advertising our products; though we know we have to achieve a balance, it is very hard to find out that balance." On top of these challenges, the relentless pace of the game forced some teams to make decisions faster without full understanding of the implications and without analyzing previous quarter performance. On a positive note, participants generally felt that the checking many reports regularly made their job more complex. As nicely summed up by one participant, "though it is challenging to understand that the business is 'integrated' through the system, once understood, it has immensely helped in decision making."

The above anecdotal evidence suggest that the challenging aspects are – fast pace of the game especially at the beginning, inadequate knowledge of accounting and finance, lack of experience, team work collaboration and communication, complexity of SAP and general lack of business experience and knowledge. In addition, working in teams is identified as the most challenging aspect of this game. This requires participants to recognize the inter-dependencies and manage distribution of tasks, coordinating the decisions and actions, and continuously communicate among themselves. All of these aspects typically are required in a dynamic business environment and facilitated by an ERP system. Some of the participants also pointed out information overload. ERP system produces a large volume of information because of its transactional nature, and requires discerning manager to look for information that is relevant and useful for a particular decision making. Considering the complexity of the SAP software, it is normal for participants who had no previous exposure to the ERP system software to feel the pressure and view this as information overload and too complex. Interestingly, less than 10% of the participants pointed out this as a challenge. Therefore, it is safe to conclude that three weeks of traditional learning that employed lectures, case study discussions and exposure to SAP screens performing some routine transactions, has helped students to better prepare for the game. Given the focus of most comments on the decision making and group working, the model appears to have worked well in delivering improved SAP skills and process orientation, without getting bogged down with the complexity of the SAP software. Thus, this model of teaching appears to have achieved a delicate balance in achieving the learning objectives.

V. CONCLUSIONS

Imparting business process orientation and teaching complex SAP software skills in a stimulating environment and ensuring that deep learning has taken place in this process is always a challenge. The learning however, is found to be better in this mode where first three weeks were spent in exposing students to the SAP screens, general explanation of the process concepts, than the previous attempt where students were straightaway exposed to the simulation game. Many participants felt that understanding SAP is a critical requirement for students to concentrate on the business side rather than lost in the complexity of SAP. Though students seem to have picked this up as they progressed from the fourth week to 9th week, there are some participants who failed to move forward and apparently 'lost' in dealing with the complexity of SAP. Importantly, this study observed the inadequate understanding of the finance/accounting related issues and inability of participants to understand, interpret and react to the various financial ratios that were reported by the game at the end of each quarter. The ERP Sim participants' guide though is clear in explaining the SAP transactions and settings in the system, it is found to be inadequate in providing business knowledge, particularly relating to finance and accounting aspects.

Majority of the participants did not feel threatened by the SAP and its complexity as most of the transactions and operations are automated. In the absence of some explanation as to the cause and effect relationships between the game outcomes and the decisions teams make, it has become difficult for the teams to actively learn. Participants also felt that a detailed feedback on group's performance pointing out their strategies, decision and the consequent outcomes would have helped their understanding immensely. Though debriefing session appears to have covered some of those concepts, participants generally preferred a written feedback from the academics, especially on the financial reports.

Importantly, participants recognized the significance of 'reflection', 'deep learning', 'team work', and 'integrated environment' and underlying dimensions of 'process orientation' while playing the ERPsim game, and reinforced the value of experimentation and reflection that are considered vital to sustainable success as suggested by Edmondson (2008). This ERP Simulation game has made participants recognize the importance of those values and thereby help them develop those skills vital for their success in modern organizations. While it is not easy and quick to impart 'process orientation', ERP simulation game definitely helped them in appreciating the significance of processes and their management, in addition to making it easy and fun to acquire much sought after software skills that could potentially enhance their employability. Students thus can acquire two things – process orientation, a key graduate skill industry wants and software skills that will make it easy for them to operate.

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