Making It Real: Immersing Students
In Week Long
Enterprise Resource Planning Simulations

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Abstract

Millions of students worldwide are pursuing business or technical degrees in disparate specialty areas. For many, they will find themselves engaged in predominantly theoretical based learning, making it difficult to acquire industry based tools and techniques which will be beneficial in the marketplace. Colleges and universities, in an effort to bridge the gap between learning and application, have begun to implement more applied teaching strategies. These innovative teaching practices have evolved into important faculty and graduate student research areas. For degree programs focused on supply chain management, it is critical for students to engage in applied learning, making them more marketable in the workplace and ultimately more productive as an employee. In the College of Technology at Purdue University, the Technology Leadership and Innovation department, through the Industrial Distribution curriculum, actively integrates applied teaching strategies into supply chain coursework. Specifically this has been done through the use of team-based ERP system simulations. The end goal of the department is to develop a concrete curriculum that draws on industry standards and practices. Uniquely positioned as a graduate student, this paper explores the business simulations in two ways: as an instructor to undergraduate students and as a student participating in graduate coursework.

Traditional class simulations are constrained by the time block allocated to the class session. The problem with this is that the students are forced to make decisions quickly and without emphasis on planning, which would be typical in a business environment. In order to make the manufacturing supply chain simulation more realistic, we experimented with a unique simulation strategy in a graduate course. With the emphasis on understanding both ERP and supply chain processes, our instructor implemented a technique shared from initial ERP training sessions attended. In lieu of playing the simulation only during the designated course timeframe, the simulation was played with multiple iterations where a business quarter was simulated over one week. Students were able to plan their actions carefully as every simulated month took place over one actual day.
This pilot study examines student reactions and the impact on cognitive development associated with both the traditional and extended version of the ERP SAP simulation. Exploring the student experience within the context of the outlined phenomenology is the ultimate objective.

Introduction

Industry jobs today rely strongly on interdepartmental collaboration. Consequently, many organizations develop employees whose core competencies transcend that of their own departments which, in many instances, drives organizational success. Cooperation and teamwork is essential among functional units in order to assist employees in developing functional expertise. By acquiring a diverse skill set and developing a broad degree of expertise, professionals are able to set themselves apart from their peers. This is especially true for supply chain specialists. Individuals who possess broad based understanding and knowledge of interdepartmental processes are considered valuable assets within organizations today.

Working cooperatively and cross training supply chain professionals leads to increased operational efficiencies. Since supply chain management is a multifaceted discipline, supply chain personnel will need to acquire expertise in functions such as purchasing, transportation, logistics, and production planning, if they are to be perceived as a supply chain expert. The more versed in business processes, the easier it is for an individual to effectively manage others and excel in the role of a supply chain manager. Thomas Olesen, chief supply chain officer of Bonneville Power Administration, believes that obtaining better knowledge and understanding of each team’s impact on others helps organizations create sustainable value. It is not uncommon for employers to encourage new supply chain personnel to partake in a training program to help foster critical skills and knowledge by job rotation through multiple functional areas. To ensure employees are ready for job advancement opportunities they need to develop sound business acumen, and according to the employee learning argument, job rotation is one way to make that happen.

In addition to functional expertise, employees today are also expected to be knowledgeable using software solutions that compliment business processes. This is especially true of supply chain personnel. Enterprise Resource Planning (ERP) systems are one of the most common end to end software solutions used in industry today and recently ERP simulations have begun to be used as a mechanism of enhancing employee knowledge. Simulations tend to be engaging and therefore easily maintain the interest of participants. Through active engagement in business scenarios and initiatives, employee learning is fostered.

Just as simulations are being used as a training mechanism in industry today, they are also being introduced in higher education as a means of fostering learning and knowledge between students. While it is unrealistic to rotate students through an on-site training program to expand student knowledge, participation in a simulation is not only feasible but already underway on many campuses throughout the world. This is especially true of SAP ERP software and for active members of the SAP University Alliance program.

The SAP University Alliances program is a global endeavor that provides university faculty members with the tools and resources necessary to teach students how technology
can enable integrated business processes and strategic thinking – and gives students the skills to add immediate value to the marketplace\textsuperscript{3}.

Participating universities and college members are provided access to SAP’s business product suite as well as to proprietary technology developed by world renowned ERP and Supply chain faculty. One such technological development is ERPsim\textsuperscript{2} software which was developed by researchers at HEC Montréal. These business simulations encourage students to perform business operations consistent with those they would in industry by using SAP ERP, the same industry specific tools utilized by many fortune 500 companies in industry today\textsuperscript{1}. Through these interactive SAP experiences, students gain insight into how technology impacts all aspects of the supply chain. Understanding and knowledge are natural bi-products of simulation participation and the two themes ultimately create paths which all point back to success\textsuperscript{7}.

Both simulation offerings, traditional and extended play, are executed with the goal of acclimating students to industry specific processes, practices and integrated technology. Using a team based approach, students’ confidence increases as they competitively migrate from transaction based thinking to team based process thinking while mastering SAP navigation\textsuperscript{5}. ERPsim simulations provide an opportunity for students to engage in the use of industry based analytical and decision making tools preparing them for the future\textsuperscript{1}.

**Research Question**

This pilot study examines students’ reaction and the impact on cognitive development as they interact with both the traditional and extended version of the ERP SAP simulation. The following research questions guided this study:

1. Do students view both versions of the simulation, traditional and extended version, similar in providing industry specific knowledge? Advantages of each?

2. Did students prefer one version of the simulation over the other?

3. Was there an advantage in engaging in the simulations in a hierarchical fashion – traditional simulation played prior to the extended version?

4. Was either version more beneficial in impacting long term retention of knowledge?

**Sample**

This pilot study consisted of five graduate students all participating on the same team. Three were master’s level candidates and two PhD candidates, all enrolled in the College of Technology. Of the five participants, there was one male, from Brazil, and the four females were from Columbia, Taiwan, India and the United States. The study was quasi-experimental, in that participation in the simulation was not optional as it was a course requirement. However, the researcher did assess the willingness of all team members to provide feedback in the form of interviews, questionnaires and e-mail correspondence regarding their individual experiences and received verbal consent prior to commencing the activity.
Procedures

Students participated in two versions of the ERP simulation. Initially they played the game in traditional fashion during the scheduled course block. The second iteration was an unexpected course component. Their instructor announced that as a means of expanding knowledge that the students would participate in a week long version of the game. Typically the game is played in three 10-15 minute rounds with debriefing in between each period. In the extended version of the game, each period was run over 30 hours. The instructor would notify students when each new period would commence providing an opportunity for teams to strategize and formulate operational plans. Written feedback from team participants was not obtained until the conclusion of the extended version of the game. Participants were asked a series of five open ended questions to solicit information regarding the impact of the experiences on their learning. Specifically, the researcher was interested in understanding student perception of the advantages and disadvantages of each version and if they had a preference. Additionally, she wanted to ascertain if playing the traditional version prior to the extended version had any impact to cognitive development.

Students were also asked to independently complete an electronic questionnaire. Questions were open ended providing an opportunity for students to elaborate or expand upon answers. Uniquely positioned, the researcher did not complete a questionnaire, but integrated personal experiences which are factored into the research results.

Results

The researcher sought to accurately present findings surrounding the research questions by examining the personal experience of the participants through soliciting and reviewing feedback. Using technology, Van Manen’s analysis method was adapted to an on-line approach. The methodology was used to facilitate the collection, consolidation and interpretation of data to identify any themes, trends and patterns that emerged. The results are outlined below:

Both Versions offer Relevance

Four of the five team members found both versions of the simulation to be of value for different reasons. Related to the traditional simulation, one team member explained, “The one hour version was helpful in terms of introduction to the software and in order to understand the basics command and main parts of the simulation.” Another concurred stating, “I would prefer starting out with 1 hour game so all the team members get a chance to talk and discuss strategies before playing the extended version.” Another added, “The one hour version provides a quick general picture of the game, the kind of decisions participants have to make and the overall objective.”

Having experienced the phenomenon, the researcher believes the shortened version is relevant in that it provides foundational knowledge associated with game methodology; navigation, scope, objectives, and familiarization.

In the traditional version, because the passing of time is so rapid, roles and responsibilities tend to be divided. In the extended version of the game, time passes at a much slower pace allowing
for a greater degree of data (transactional) analysis. Other members expressed as, “It allowed us to work in a more elaborative way in which we could see greater details and make better and reliable decisions,” and “It provided more time to think and act and allowed the opportunity to do multiple things at once.” Finally, one shared, “It allows participants to make deep analysis of the different reports available, and time to create and implement different strategies.”

Finally, participants felt the traditional game provided foundational knowledge that could be expanded upon by playing the extended version of the game. One mentioned, “It is very important to first become familiar with the software before playing the extended version. Another affirmed offering, “Playing the traditional game helped me understand SAP. Otherwise I would have to deal with understanding the SAP system and strategy of the game at the same time.”

**Extended Version Preference**

While participants found relevance in both versions of the game, only one participant preferred the shortened version of the game to the extended version stating, “I preferred the shortened version because I like to gather together and have discussions during the game. Face to face discussions allow for solving problems efficiently and fast.”

Most members found the extended version of the simulation to be more beneficial due the ability to take control of multiple functional areas. One volunteered, “Our team strategy was to have one dedicated person take charge of whole game for certain designated hours.” Others offered, “I feel that what made it most interesting was to see all functional areas of the game and be able to make decisions that simulate real world scenarios,” and “The three day version allowed us the opportunity to play any role within the game.”

The extended version of the game is unique in that it mimics a rotational training program. Students don’t only concentrate on learning one functional area but rather are given an opportunity to learn and manage all interrelated processes revealing dependencies and opportunities. They become responsible for the decision making process. Others concurred, “I get to be in charge of all decision making in the game,” “The three day game divides the time amongst every single person, so I could play with all of the transaction by myself and I began to understand the whole process,” and “I think the major advantage is that they will understand the connections among the different areas in order to make decisions and create effective strategies on the overall system.”

**The Extended Version Promotes Better Knowledge Retention**

While some team members felt the traditional version of the simulation could positively impact knowledge retention, it was more consistently supported that participation in the extended version of the game would foster better long term knowledge retention. One student felt, “The longer game will be more beneficial in fostering knowledge retention since I spent more time understanding the SAP software. In the one hour game everything was happening too fast, like firefighting. The three day game is more relaxed so you can plan your strategies well.” Another confirmed by offering, “I think the extended version helped the most because during the timeframe the participant is responsible for the game, she/he has to repeat the transactions several times and in the different areas.” As previously mentioned, the shortened version of the
game tends to lend itself to each participant being assigned a specific role. In some ways it becomes repetitive with individuals performing the same transaction repetitively without fully understanding the dependency on the other interrelated processes.

Link to Industry

Most team members thought participation in the simulation paralleled what they would encounter in industry. One team member elaborated,

Absolutely, if you have experience in industry you can clearly see the linkage between business processes operated during the simulation, and the real day-to-day processes encountered in industry. However, if you don’t have industry experience, this simulation shows exactly what happens out there.

Another team member with industry experience further explained,

Each company has its particular characteristics. The manufacturing game provides a simple overview of the general business processes that any industry faces. I believe it’s a good exercise from the academic point of view but companies are a lot more complicated with more variables to control.

Participants felt they gained exposure to real world scenarios; it helped them understand the entire business process. The following student’s comment allows us to understand the insight they gained to specific practices – “What I learned from the three day version was there is a shipping time that could affect operational strategy.” The experience allowed for a more in-depth understanding of operational strategies. Placing one individual in charge of all processes – forecasting, purchasing, product composition, production scheduling, pricing, & marketing, made complexities transparent and revealed the importance of inter-departmental collaboration. On that note however, related to complete ownership of all business processes one student commented, “In real world one person will not be able to do all the activities we did in the 3 day game…One person will not have access to all the information”.

Discussion

While team members revealed they felt both versions of the simulation were beneficial, it would have been interesting to collect student feedback between each version of the game and compare participant feedback. It would also be beneficial to evaluate participants’ knowledge acquisition associated with each. When playing the extended version of the game, participants were at an advantage in that they already were familiar with the simulation mechanics. Because the passing of time moves much more rapidly in the traditional version, it can be more difficult to formulate an in-depth understanding of all the business processes supported by the simulation. Played as a precursor to the extended version, it enabled the students to participate in a pseudo “practice run”. However, if it was the only game they played in a semester, it may not be enough to solidify knowledge, as hinted at by their feedback.
The simulation experience was initiated in a lab environment, so it allowed for student collaboration. Students were able to define their roles and responsibility on their respective teams which minimized chaos and encouraged teamwork. The simulation was a team centric activity, so working together was of utmost importance. There was not a defined script that discussed how the work should be divided and understanding how participants divide responsibility, based on function or process, in each version of the game would be beneficial.

Conclusions and Future Work

While this study was limited in scope with only one team of five members providing feedback, it supported the idea that extended simulations provide greater insight and more in-depth exposure to business specific processes and knowledge and can be beneficial in skill development. A general advantage of using a simulation for skill development is that it is likely to yield greater transfer of training to the work environment because actual behaviors are practiced in the context of other managerial activities and responsibilities. The extended version of the simulation moved the participant to a more advanced level of learning. If individuals rotate assuming sole responsibility for extended periods of time, concepts are reinforced and dependencies more thoroughly understood. While the results cannot be generalized without further research, the implications of using extended versions of ERP simulations to extend knowledge for both students and employees in the supply chain profession could be advantageous to the profession. For students, it could ensure adequate preparation prior to entering the workforce. In industry, it could be used to augment or place existing rotational training programs and ensure a more intense level of learning.

An area requiring additional attention would be to determine knowledge acquisition using both the traditional game and the extended version of the game in isolation. Developing and using an assessment mechanism to help formulate an understanding of knowledge at the completion of each is critical. It would help identify the impact on knowledge acquisition associated with each, reveal any variance that existed between the two versions and help formulate which would be more beneficial to extend knowledge in both academia and industry. In addition, studying team composition of both gender and ethnicity could be investigated. The preliminary information indicates a need to pursue additional research studies in this area. Multiple variations of this study are needed to shed additional light on this topic.

Bibliography


**Biographical Information**

Kim Deranek is a PhD student in the College of Technology at Purdue University. Her research interests focus on process improvement, lean methodologies, and technology integration in both academia and industry within the supply chain realm. Kim has expertise in incorporating manufacturing systems in the classroom to prepare students with the necessary skills to be innovators in their field. She has also worked with industry partners to assess and optimize software solutions, 3PL strategies, warehouse and inventory design, and data management strategies.

Dr. Edie Schmidt is a professor and acting Associate Dean of Research for the College of Technology at Purdue University. Her teaching and research interests are in the areas of inventory management, distribution, logistics, and supply chain management. She has developed and taught undergraduate and graduate-level courses and has supervised graduate student projects. Dr. Schmidt has worked with many Indiana companies to develop a logistics training course, revise warehouse layouts, revise facility layouts, and other projects in the Logistics area.