ERP SIMULATION GAME: ESTABLISHING ENGAGEMENT, COLLABORATION AND LEARNING

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Abstract

The importance of ERP (enterprise resource planning) systems as a major system for organisational change and transformation has been one of the main reasons they have created such excitement within the educational arena. This paper examines the use of an ERP simulation game to prepare university graduates to meet the challenge of a global supply chain environment. It describes the novel approach taken to adapt the HEC Montreal ERP simulation game into a one day online inter-institutional competition. The competition involved teams of university students and lecturers from four Melbourne-based universities who, with the help of industry mentors, put their business skills to the test for an intensive simulation game by using a real world ERP system: SAP. The teams ran the full business cycle of a small manufacturing company, while interacting with suppliers and customers by sending and receiving orders, delivering the product and completing the entire cash-to-cash cycle. To develop a range of business and ‘soft’ skills, participants adopted individual business roles and made life-like decisions around the product they were selling: muesli bars. In general, participants felt that although their general knowledge of ERP systems was low, the game fully demonstrated the interaction of the supply chain. Additionally the game exceeded their expectations as they worked alongside an industry mentor in a team environment to achieve a common goal.

Keywords: Supply Chain, simulation game, ERP, education, experiential learning
1 INTRODUCTION

ERP systems are standard software solutions that automate and integrate business processes by incorporating the core functionality (such as materials management, production management, sales and distribution, accounting and human resource management) by using one single logical database to capture the data (Rosemann et al. 2000, p1). Their significance in the field of education has developed exponentially since the growth in ERP implementations in the 1990s created a high demand for ERP skills from graduates. This led to a rethinking regarding the effectiveness of the traditional method of lecturing whereby textbooks coupled with the deployment of case studies were used to explain theoretical enterprise system concepts in order to educate and adequately prepare graduates for a working environment (Watson & Schneider 1999). Because of this, significant research over the last ten years, has been conducted into the adoption of enterprise resource planning (ERP) systems and their integration into higher education curriculum explicitly to provide help to academics who are faced with the difficult task of incorporating these systems into their curriculum (Hawking et al. 2004; Cannon et al. 2004; Johnson et al. 2004; Wills & Clerkin 2009; Seethamraju, 2008; Strong et al. 2006; Kreie et al. 2010). This prompted a range of learnings from these integrations, such as that provided by Fedorowicz et al. (2004) who provided twelve tips for successfully integrating enterprise systems across the curriculum, and Wills and Clerkin (2009) who described the lessons they learned when adopting ERP education into their University curriculum.

Even chief Executives waded into the enterprise system curriculum debate by recommending that universities could improve their enterprise system curricula in a number of important ways: firstly, by providing graduates with a range of skills that were valued by industry and secondly by expanding training in: soft skills (leadership, teamwork, communication, work in virtual teams), improving the quality of functional business education (Finance, marketing, production etc), improving training in IT skills, improving the relevance regarding practical, real life scenarios and by offering more opportunity to partner with companies (Murray 2008).

The advent of the University Alliances program, a global SAP endeavour for providing universities with the tools and resources to teach ERP systems and their associated extended software, has made a considerable difference to the way these systems are taught and portrayed in an educational setting (Antonucci, 2004; Joseph & George 2006; Kreie et al. 2010). Additionally the adoption of such tools as enterprise simulation games have been effective for educators since they can be used to demonstrate life-like scenarios enabling participants to gain functional business knowledge while developing valuable decision-making skills (Kreie et al. 2010). Thus providing participants with the opportunity to think critically and quickly when analyzing real world problems in a safe learning environment. These skills have been shown to be invaluable in the current job market (Kim, Hsu & Stern, 2006; Mackrell, 2009).

1.1 Simulation games in education

Using computer based simulation games to teach enterprise concepts is not a new educational approach (Leutner 1993). One such game, the Beer Distribution Game, was developed at MIT almost 30 years ago to simulate ‘hands on’ experience of supply chain management problems for business training (Anderson & Morrice 2000). This concept illustrated the bullwhip-effect that caused high variability in orders and inventory levels due to non-linearities and time delays between the actors in a supply chain (Corse et al. 2006 p57). However the game was limited by its reinforcement of the bullwhip-effect which demonstrated inadequate information sharing across the supply chain. The fact that it was played using a board, limited the players to turn taking with set decisions being made and requiring a fixed response. Another early example is the ‘Tailorshop’, a computer simulation game where participants undertook the role of manager to run a small simulated production company (Putz-Osterloh, 1981 cited in Leutner, 1993). A more recent contribution comes from the Harvard business School (2004). They developed an interactive Global Supply Chain Management Simulation game to
provide participants with the opportunity to make decisions regarding the rollout of two models of mobile phones. Participants chose product feature sets, supplier selection, demand planning and pricing and marketing. It was designed to create a balanced supply chain across suppliers with different lead times, building flexibility into the supply chain to avoid stock-outs and excessive inventory using demand forecasts (Harvard Business School 2004). However it did not involve a real-world continuous play environment therefore limiting the experience of the participants. A further supply chain game was developed by researchers at Delft University and the University of Maryland. The game, referred to as the Global Supply Chain Game (GSCG), is centered on globalization and a real-time supply chain. This game differed from other existing business learning games as it simulated a real-world experience by operating on a continuous clock with ongoing events and responses to individual decisions (Van Houten et al. 2005). Thus doing away with turn taking and following a single concept.

In general these systems are referred to as ‘complex’ and ‘dynamic’ as decisions made in one part of the system can impact and have influence on other parts of the system often without direct manipulation by the participant (Leutner 1993). Using simulation games has provided educators and business trainers alike with an alternative to traditional and conventional modes of classroom instruction (Kreie et al. 2010).

Pedagogical objectives of using computer based simulation games are many and diverse. Simulation games are known to: 1. Demonstrate how information systems support business strategies; 2. Develop conceptual knowledge underlying the enterprise system; 3. Develop technical skills by using the enterprise software and 4. Teach participants to work collaboratively using a variety of skills to achieve a common goal (Leger 2006). These objectives are often difficult to replicate in the context of standard pedagogical teaching practices.

### 1.2 ERP in education

Many educators in the IS and business area have found that using an ERP system to demonstrate business concepts is an excellent way to integrate curricula, while optimizing the use of real world technology. This has been particularly important as companies consider ERP systems as essential infrastructure for their daily operations and a critical foundation for business transformation (Davenport et al. 2004). Since they are the single largest and most important investment in an organisation’s history, their importance as a major system for organisational change and transformation has not gone unnoticed in the information systems educational arena (Francoise et al. 2009).

Using ERP systems to teach business concepts can be viewed as more than just using technology, but rather as having the potential to bring about a more effective pedagogy (Joseph & George 2006). Results from a worldwide survey conducted by Gable & Rosemann (1999) on enterprise systems teaching, demonstrated that hands-on experience is the main success factor for learning ERP software.

Although these systems provide students with the opportunity to adopt a hands on learning approach by demonstrating key concepts such as integration of core business functionality and best practice business processes, practice in learning real world business functionality and ‘soft skills’ still seems to be lacking. One approach to ensure students not only obtain ERP knowledge in a business setting but also have the ability to apply this knowledge while developing ‘soft skills’ is offered by the ERP supply chain simulation game. The most well-known is the HEC Montreal ERP simulation game.

### 1.3 The HEC Montreal ERP simulation game

This real world game offers a unique opportunity for participants to operate, as closely as possible, to a real world business using enterprise system concepts. Leger (2010) describes the simulation game as a ‘serious game for learning ERP concepts’ (p1). The game has been played in more than 100
universities worldwide and many Fortune 1000 organisations such as Deloitte, SAP, Coca Cola and Croyola use the game to train their end-users (Leger 2010; Leger, et al. 2009).

The ERP simulation game is coupled with ERP technology and operates as it would in a real world context. The simulation software, ERPsim, serves three functions: 1. It provides a simulation of a make-to-order manufacturing supply chain where a buyers and sellers market responds and behaves just as it would in a real world setting; 2. Participants operate the full business cycle; plan procure produce and sell to experience the value of up and down stream information flows; while SAP transaction reports and dashboards enable participants to execute business decisions; 3. The most essential function of the game is to simulate the passing of time. The simulation compresses time into short spaces but creates the appearance of time passing. This ensures that the impact of decisions can be evaluated and participants are able to adjust their decision making processes in line with the profitability of their business.

By using an ERPsimulation game participants have the opportunity to understand the complexity of running a real company in a real system as opposed to a simulated environment that only focuses on strategy (Draijer & Schenk 2004). Figure 1 demonstrates the scope of the ERP simulation game.

**Figure 1:** Scope of the simulation (adapted from Leger, 2010)

Figure 1 identifies not only the ERP functionality and the integration points, but also the interrelationships between the different business partners in the supply chain. Customers’ orders (demand) provide the catalyst for production planning, creating planned orders, procurement of raw materials (supply) and ultimately production leading to revenue generation. The planning process is based on product sales information: e.g. if sales fall below an optimum level for a particular product(s), teams must make quick and informed decisions about the future pricing and marketing of that product and take the necessary steps to increase sales; usually by reducing price. Similarly decision points will need to be considered in the event of an upsurge in product sales: ‘Should stocks be replenished?’ or ‘Should pricing be increased?’ and ‘How long should this last?’

To assess the efficacy of adopting the ERP simulation game in an education setting, research was conducted to assess the value students derived from being involved in the game. Leger et al. (2009) proposed that an ERP simulation game constitutes a controlled laboratory experiment and thus can bring a new dimension to ERP research. Since the game is simulated and the data is held and reported upon, it provides the researcher with a plethora of data that are typically not normally available, additionally the team environment lends itself well to research.
1.4 The Victorian Universities ERP Simulation Competition

The HEC Montréal ERP simulation game was adapted by changing the structure and team roles, into a one-day event held at a university in Melbourne. Two novel approaches were adopted: firstly, students from four major universities were brought together to play in the game and secondly, industry experts provided expert help to each team. The game consisted of six teams of four (N=24 overall participants); five of the teams comprised three student representatives, from four major Melbourne-based Universities (N=15 students), and an industry expert (N=5). A sixth group was made up of four academic staff from the representative universities, with no industry expert. The experts, senior managers from logistics company Linfox, everyday users of Enterprise Resource Planning (ERP) systems, acted as mentors to coach the teams in their supply-chain decision making. The teams worked collaboratively in a state-of-the-art business centre. Establishing a team identity was essential. Therefore teams were primed to conduct preparatory meetings beforehand, and to research information about the simulation game and SAP ERP systems in particular. The teams differentiated themselves by wearing matching and distinguishing caps and/or tee-shirts. SAP provided the facilitator for the event, access to the simulation software and documentation which included a glossary of terms and standard SAP functions. As an initial introduction, the facilitator walked students through the strategy of the game, and provided them with the glossary of terms as a quick reference guide.

Using the leading ERP software from SAP, the team members undertook roles as executives of a muesli bar company. This required them to interact with suppliers and customers through the entire supply chain cycle: buying raw materials, managing budgets, developing products, organizing production and distribution schedules, and selling their products. The teams responded to changing real-life variables such as an increase in grain prices or a decrease in the foreign exchange rate, with every 25 minutes in real life simulating 30 days (representative of a quarter). At the end of each 25 minute session the results showing how each team performed were displayed. This enabled the teams to adjust their strategy. At the end of the day the winning team was determined based on the highest sales. It should be noted that previous skills in using an ERP system was not a prerequisite for participants to play this game.

The event was comprised of two identical games, run over three timed rounds. Game 1 was divided into two halves, representing the first and second halves of a year, Round 1 and Round 2. The second game, representing a full year, was run in a single session; Round 3. Prior to this an introductory ‘trial round’ was conducted to familiarize the participants with the workings of the game, the system interface, and the different roles within each group.

1.5 Methodology

The ultimate goal in conducting this research was to analyse a range of key competencies that playing such a game may elucidate from students. These included being able to accurately and quickly analyse the relevance of up to date data, develop and extend analytical skills, establish an understanding of end to end business processes and develop team skills that support decision-making.

The research approach taken to analyse these competencies involved a mix of both qualitative and quantitative data techniques: quantitative data was extracted from the system for analysis as the simulation system is designed to automatically capture performance data and record teams’ actions. Alternatively a mix of qual- and quant- data was recorded from two self-completion questionnaires. Self-completion style questionnaires were distributed at two stages throughout the day; the questionnaires involved a mixture of quantitative, yes/no and Likert scale responses, as well as longer, more descriptive, qualitative answers. Questionnaire 1 was issued near the start of the day, after the trial round of the simulation; and Questionnaire 2 was given out at the end of the day, after the final round of the simulation had been completed. Questionnaire 1 contained seven questions designed to capture initial data about the learning experience of the participants; for example, how they viewed teamwork within their particular group, what their expectations were for the event and whether or not
they were planning any change of strategy based upon their ‘learned’ experiences thus far. Questionnaire 2 contained fifteen questions designed to capture participants’ reflections on their team experience, working with a mentor, level of skill development, experience gained from working with SAP ERP, and general reflections regarding whether the game lived up to expectations. The questionnaires were positioned at strategic points throughout the day to capture participants’ significant learnings and analyse team perspectives. Using qualitative and quantitative data provided the opportunity for triangulation, in that the analysis from the quantitative data validated findings obtained from the qualitative data.

1.6 Results – Questionnaire 1

The results from the first questionnaire, completed after a ‘test’ round at the start of the day, unearthed some interesting data about the experience level of the participants, their expectations, their initial impressions of the simulation game and their opinions as to how realistic an experience they found it to be. The outcomes are discussed below.

1.6.1 Participant experience level

Participants were asked to rate their previous exposure to supply chain data using a scale of 1-5; (where 1 = no experience, 5 = expert). The outcomes are shown in Figure 2.

![Figure 2: Level of previous exposure to supply chain data](image)

The majority of participants 72% (N=24) identified that they had little previous exposure to supply chain; while two participants (both industry mentors) described themselves as an ‘expert’. In general the experience level of the cohort was low.

1.6.2 Initial impressions

Respondents were asked to provide their initial impressions of the game. The responses from the students from the different universities varied from ‘exciting,’ ‘engaging,’ ‘enjoyable,’ and ‘fun,’ to ‘hard,’ ‘complex,’ and ‘challenging’. The overall response was positive. There was no difference in comments between universities.
1.6.3 **Realism of the first simulation**

Respondents were asked to indicate how realistic they thought the first simulation trial round: 84% rated it as either moderately realistic or realistic. Two participants thought it was ‘very realistic’ with the same number intimating it was very unrealistic (Figure 3).

![Figure 3. Participants’ perception of how realistic they found their first simulation game](image)

1.6.4 **Changes to the simulation**

Respondents were asked to suggest anything about the simulation game that could be changed to make it more realistic, in general students would have liked to incorporate fixed and variable cost, overhead costs and inventory holding costs; manage inventory on a time basis; slow the timer down; automate price changes, and provide a summary of key KPI data.

1.6.5 **Working together in a team (1 to 5)**

Of the 22 respondents who commented, 27% (N=6) stated they had worked very well together; 55% (N=12) said they had worked well; 13% (N=3) worked Okay together; only 1 academic stated the team had worked very badly together. Students seemed to work better together in general than the academics. This could be because the students are expected to work together in teams in a university setting with some of the team members already knowing each other; while the academics in this game had not met each other before but had had some experience with SAP indicating that they may have had set ideas about how to interact within the requirements of the game but making it difficult for them to interact together in a team environment.

1.6.6 **Improving the team work**

Respondents were asked to state how teamwork could be improved in the next round of the game; in general respondents would have liked more time to work as a team and plan and discuss options; have more experience with SAP; make less errors and have slightly better communication. In general across all teams they felt there should be more time for team planning and discussion.

1.6.7 **Expectations for improving management of supply chain information**

Respondents were asked to rank their expectations in terms of improving their ability to manage realistic supply chain information. Of the 22 respondents, 63% (N=14) stated they had high expectations; while 36% (N=8) stated they had some expectations.
Game 1 Data

As outlined earlier, Game 1 of the simulation event was split into two sessions; Round 1 and Round 2. The first round of performance data, captured automatically by the system, indicated that the VU1 team performed the best, generating a net income of $6,471,872.26 and total sales of $9,390,824.38, with RMIT and Swinburne a close second and third. The mixed staff team, without the benefit of guidance of an industry mentor, performed the poorest and failed to break-even for the first six months (Table 1).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Team</th>
<th>Net Income ($)</th>
<th>Total Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Victoria University1 (VU1)</td>
<td>810,880.65</td>
<td>2,227,421.07</td>
</tr>
<tr>
<td>2</td>
<td>RMIT</td>
<td>784,697.06</td>
<td>2,186,492.48</td>
</tr>
<tr>
<td>3</td>
<td>Swinburne</td>
<td>720,239.41</td>
<td>2,123,055.81</td>
</tr>
<tr>
<td>4</td>
<td>Victoria University2 (VU2)</td>
<td>184,495.75</td>
<td>1,226,105.75</td>
</tr>
<tr>
<td>5</td>
<td>Monash</td>
<td>91,632.72</td>
<td>1,737,712.50</td>
</tr>
<tr>
<td>6</td>
<td>Mixed Staff Team (MST)</td>
<td>-368,312.79</td>
<td>1,301,056.60</td>
</tr>
</tbody>
</table>

Table 1. Summary of Results from Game 1 (Round 1)

The game data captured for Round 2 indicated an improvement in performance from all teams, as the participants continued to become familiarized with the game structure, system interface, and their roles within their team. All teams managed to double their total sales figures for the second half of Game 1 whilst subsequently greatly improving their net incomes (Table 2).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Team</th>
<th>Net Income ($)</th>
<th>Total Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VU1</td>
<td>2,619,725.34</td>
<td>5,747,265.77</td>
</tr>
<tr>
<td>2</td>
<td>Swinburne</td>
<td>2,136,089.02</td>
<td>5,450,234.71</td>
</tr>
<tr>
<td>3</td>
<td>RMIT</td>
<td>1,357,396.84</td>
<td>4,410,397.50</td>
</tr>
<tr>
<td>4</td>
<td>Monash</td>
<td>645,633.22</td>
<td>4,115,663.20</td>
</tr>
<tr>
<td>5</td>
<td>VU2</td>
<td>438,550.81</td>
<td>2,967,786.84</td>
</tr>
<tr>
<td>6</td>
<td>MST</td>
<td>-22,202.97</td>
<td>2,805,253.65</td>
</tr>
</tbody>
</table>

Table 2. Summary of Results from Game 1 (Round 2)

Game 2 Data

In the second game, a repeat of the first two rounds ran as a single session, all teams continued to exhibit stark levels of improvement. (Table 3).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Team</th>
<th>Net Income ($)</th>
<th>Total Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>VU1</td>
<td>6,471,872.26</td>
<td>9,390,824.38</td>
</tr>
<tr>
<td>2</td>
<td>Monash University</td>
<td>6,428,891.79</td>
<td>9,409,879.55</td>
</tr>
<tr>
<td>3</td>
<td>VU2</td>
<td>6,182,406.02</td>
<td>8,547,821.09</td>
</tr>
<tr>
<td>4</td>
<td>Swinburne University</td>
<td>5,341,647.25</td>
<td>8,097,122.25</td>
</tr>
<tr>
<td>5</td>
<td>RMIT</td>
<td>5,300,508.43</td>
<td>8,094,675.40</td>
</tr>
<tr>
<td>6</td>
<td>Mixed Staff Team (MST)</td>
<td>4,691,214.01</td>
<td>7,787,083.33</td>
</tr>
</tbody>
</table>

Table 3. Summary of Results from Game 2
VU1 came out on top again, and managed to improve their net income by 323% and total sales by 258%, in comparison with their performance in Game 1. The Mixed Staff Team, whilst still finishing last, made great improvements achieving net income and sales figures that would have earned them a 1st place finish in Game 1.

### 1.7 Questionnaire 2 Results

The objective of questionnaire 2 was to ascertain the functional knowledge acquired by the university teams while working in a team environment using SAP/ERP to simulate a real world Supply chain. The questionnaire contained eleven questions. Questions 1 to 10 required participants to answer a variety of qualitative questions and question 11 used a Likert scale requiring participants to state the level of expectations for the day. The outcomes are discussed below.

<table>
<thead>
<tr>
<th>Question</th>
<th>Condensed answers from all teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. What did you like the most about your game experience today?</td>
<td>In general team players liked: the realism of the game experience by using a real world supply chain; having the opportunity to have hands on learning experience in a competitive environment; having the opportunity to make strategic decisions in a team environment and be able to interact with an industry mentor.</td>
</tr>
<tr>
<td>Q2. What did you like the least about your experience today?</td>
<td>The teams found the game complex with short lead in times; some of the business decisions were rushed due to the time frames, and because participants lacked understanding of the game and general business knowledge they lacked insight into what went wrong; they found the web interface was quite slow thus slowing the system reaction time to decisions which they found frustrating.</td>
</tr>
<tr>
<td>Q3. Describe the team experience</td>
<td>In general once the teams had identified their individual roles they worked well together with strong communication skills. Some teams found their skill sets complemented each other and another team found that by discussing the most suitable strategy they were able to gain a better understanding at each quarter. One team found they had ‘teamwork spirit’.</td>
</tr>
<tr>
<td>Q4. Describe the interaction you had with your industry mentor.</td>
<td>Teams really enjoyed the opportunity to interact with an industry mentor; most found the mentor got very involved and offered effective strategic advice; one team found they offered invaluable industry and business insight and were able to share strategies the team players could use.</td>
</tr>
<tr>
<td>Q5. With your knowledge of the game what could have been done differently?</td>
<td>Most teams suggested they needed more time to absorb the information and to plan; they felt they should have increased capacity earlier and not held onto their cash as long as they did; another group suggested rotating team members through jobs more quickly to adequately use everyone’s strengths.</td>
</tr>
<tr>
<td>Q6. What additional knowledge or skills would have helped you play the game today?</td>
<td>Teams suggested more pre reading around how the game worked, having financial knowledge and knowledge of the game principles beforehand, marketing and sales knowledge and more knowledge about supply chain and business skills in general. Not one team member suggested they needed SAP knowledge to play the game.</td>
</tr>
<tr>
<td>Q7. What skills/learning edges could you take away from playing the game today?</td>
<td>Teams found that the SAP interaction and gaining an understanding of SAP were key technical skills; information flow through an integrated system was also rated highly, as was the use of communication skills; the opportunity to have a realistic experience of supply chain and effective knowledge of sales and production. Further, learning should be fun.</td>
</tr>
<tr>
<td>Q8. Do you think the skills you have gained could be applied in a real-world setting?</td>
<td>Most teams felt that some of the learnings could be applied in a real-world setting; including communication across channels, understanding of SAP interface, decision making processes; and the blending of business knowledge and IT skills was invaluable.</td>
</tr>
</tbody>
</table>
A9. Do you think you needed a general knowledge of SAP ERP before you played this game today?

Most teams felt they did not need SAP ERP knowledge before they started as everything was clearly explained and easy to use given the type of support provided; this included a glossary of terms and SAP ERP menu pathways to functional areas of SAP ERP. However one team did feel that it was difficult for other team members, who had never used SAP ERP before, and felt if they had had previous experience it would have made things easier.

Q10. A friend of yours has asked you if they should be involved in playing the supply chain game. What would you say?

Teams felt that this was an excellent opportunity to understand the business functionality behind the simulation and would definitely encourage friends to take the opportunity to play the game as they felt it was an amazing and enjoyable experience.

Question 11 provided a variety of preformulated answers requiring participants to reflect on how the game lived up to their expectations. The results, obtained after the final round of the simulation indicated a high level of satisfaction amongst the participants with playing the game.

<table>
<thead>
<tr>
<th>How did the day live up to your expectations in terms of:</th>
<th>Did Not Meet Expectations</th>
<th>Met Expectations</th>
<th>Exceeded Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning how to handle realistic supply chain information?</td>
<td>7%</td>
<td>53%</td>
<td>40%</td>
</tr>
<tr>
<td>Learning the basics behind SAP/ERP</td>
<td>0%</td>
<td>53%</td>
<td>47%</td>
</tr>
<tr>
<td>Working in a team to achieve a common goal</td>
<td>0%</td>
<td>40%</td>
<td>60%</td>
</tr>
<tr>
<td>Working with an industry mentor</td>
<td>8%</td>
<td>15%</td>
<td>77%</td>
</tr>
<tr>
<td>Learning about a real world supply chain in a safe environment</td>
<td>0%</td>
<td>47%</td>
<td>53%</td>
</tr>
</tbody>
</table>

Table 4: Results representing the extent to which expectations for the event were met

Table 4 indicates how well the day lived up to participant expectations. The game was designed to give students the emotional and intellectual experience of managing a real world company in a modern supply chain setting.

1.8 Summary of findings

Results indicated a high level of satisfaction amongst the participants: firstly the game met their expectations; secondly, participants felt prior knowledge of the SAP ERP system was not necessary; and thirdly they felt that the skills they gained from the event could be applied in a real-world environment. The results from the first questionnaire indicated that whilst there was a reasonably low level of experience amongst the participants there were still high expectations that the simulation game would improve participants’ ability to manage realistic supply chain information. While outcomes from Questionnaire 2 validated the high level of satisfaction felt amongst the participants in terms of how their expectations for the game were met after completing both games.

In general the comments indicated that although the game was fast, hard and at times complex, in general it was interesting and engaging and a great way to learn supply chain concepts. Furthermore, the impact of the industry mentors appeared to be significant, with one group, the academics, without an industry mentor finishing last in every round of the games.
The supply chain game is an innovative learning tool using a ‘learning by doing’ educational approach to teaching ERP concepts and is effective in capturing primary performance data. The performance results, obtained from the outcomes from the two games, depict a high level of performance improvement, after just one day’s play. All the participating teams successively improved their net income and sales figures, as the rounds progressed. Respondents, in general, indicated that they had learned a level of skill and experience that they could take away from the event. Such skills and experience included; ‘team communication,’ a ‘better’ or ‘initial understanding of SAP ERP,’ an understanding of how ‘information flows through an integrated system,’ the ‘importance of team roles,’ and ‘how to act in a fast-paced environment.’ The game itself was seen as ‘realistic,’ ‘hands on,’ ‘interactive,’ and a great way of ‘learning practical skills and then applying theoretical SCM knowledge to a realistic situation.’ These results together with the outcomes from the questionnaires indicate participants found a high level of satisfaction in playing the game and how it ranked in terms of meeting their expectations. Qualitative evidence also highlighted how well teams worked together and how the simulation allowed participants to immediately see the effects, whether good or bad, of their decision-making. Trevor Byrne, from SAP Education, observing the event added, “just like in real life, teams pay for poor decisions or those not made in time.”

The simulation was viewed as a realistic experience by most participants who believed that the skills they gained could be readily extrapolated to a real-world environment. Most participants felt prior knowledge of the SAP ERP system was not necessary to take part in this game, implying the game was an effective stand-alone teaching tool. While it may not be essential to have experience of SAP ERP to play the game effectively, it does appear that the leadership of an industry mentor, with experience of handling high-pressure real-life situations, is beneficial.

In essence the simulation game proved to be an excellent way of marrying a range of soft skills; such as thinking strategically, communicating effectively and analysing and problem solving, while improving functional ERP knowledge in a safe ‘virtual’ setting. Therefore providing students with many of the skills needed to make them eminently employable.

The major implicating factor for educators who are considering establishing this game as an effective supply chain learning tool is organisation and pre-planning: the need for a fully functioning training room complete with state-of-the-art equipment and access to SAP; a facilitator, who is available, and who has excellent knowledge of the game and SAP ERP to manage the game from beginning to end, and lastly liaising with a local external industry or industries to provide mentors for a day is no easy feat. Although this is cautionary many Universities who have taken up the challenge to include SAP ERP into their curriculum, have found this to be an invaluable learning experience for their students. For these Universities, moving to the next level by including a simulation game to increase ERP skills, develop business knowledge and decision making skills in a real-world environment can only increase their students’ employability. Further research over multiple games, into participant perceptions and skill development, through interviews and team observations, would allow for more in-depth research to be conducted to facilitate validation of the results obtained to date.
References


