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The Effects of Business Simulations on Teaching and Learning in IS Education: a case study of experiential learning.

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ABSTRACT

Tertiary courses traditionally have a compulsory business component. Information Systems (IS) students often question the relevance of the highly theoretical nature of the business content.

Action research has been conducted to explore the practical application of an internet-based simulation with first year IS degree students. The goals of the research were to examine the use of a business simulation as a tool for learning, assessment and performance. Student learning approaches and the IS lecturer delivery are measured via Kolb's (1984) experiential learning model. Lesson plans and learning guides have been designed around Kolb's four learning tendencies of concrete learning, reflective observation, abstract conceptualisation, and active experimentation.

This paper will assess the impact of the business simulation on student learning, reflect on the delivery methods and will discuss strengths and weaknesses of such a tool. Recommendations will be made regarding further improvements for the next iteration.

Keywords
Internet simulation model, business simulations, delivery.

1. INTRODUCTION

It has been observed and documented that UCOL Information Systems students often question the value of highly theoretical business papers as part of their Bachelor of Applied Information Systems (Kelly, *et al.*, 1999; Toki & Foster, 1999). To overcome this learning barrier the IS team created an Internet/intranet business simulation, SIMplicity (Foster, 1999).

The authors of this paper developed an action research plan to create experiential learning of business for computing students by effectively using SIMplicity. The framework for this action research followed the Cardno/Piggot-Irvine Model (1994) which consists of three phases: reconnaissance, intervention and evaluation. Within each of these phases there were four stages, consisting of planning, action, observation and reflection.

The SIMplicity business simulation involves complex systemic problems with horizontal learning across industry by teams representing companies who are competing for market share of products (Toki, *et al.*, 1999). Compressed turns represent the company's financial period. After each turn the industry and company information is generated to aid the team's next strategic business decision.

The focus of this paper is how an IS educator can effectively deliver a business simulation to create experiential learning for students. This action research approach will state the plan for the simulation delivery, discuss the student and IS educator's actions and concurrent observations; then reflect on the data by

exploring implications and identifying changes for the next iteration of simulation delivery.

This paper discusses two research objectives. The first research aim was to examine the use of a business simulation as a tool for learning, assessment and performance

Definitions:

Learning - theory, process, groupwork

Assessment - compulsory participation

Performance - simulation financial outcomes

The second research aim was to determine the effective/good design of lesson plans and learning guides for experiential learning when using a simulation.

2. PLAN

The SIMplicity simulation learning experience was planned to occur over a five-day period using a combination of four formal sessions and unsupervised student groupwork. The authors were the lecturers carrying out this student learning experience. The exercise was to be an assessment of compulsory participation.

The simulation was to be introduced and demonstrated, before students formed 20 groups of five members each to represent competitive companies. Students were to make daily company strategic decisions. Each decision was to represent a financial term. The lecturers would deliberately provide a demonstration and supply documentation to the groups before the application was made accessible to the students. An expected effect would be to whet their appetites to get stuck in. Students were told there would be a prize for the best performing company.

Lecturers would be accessible by email, telephone and in person for the duration of the student learning experience.

At the completion of five turns the students would be required to regroup in class. In this session the financial outcomes, teamwork, strategies used and simulation technique would be discussed.

A formal student evaluation form was designed to provide feedback for the next iteration.

3. ACT & OBSERVE

3.1 Implementation

Session One involved introducing the concepts of business simulation. Students reviewed the business theory and the relevance of a business simulation was confirmed. Students were told to form their groups to represent their company. Company name and strategy was discussed.

In Session Two the business simulation was demonstrated and the timeframe for the simulation explained.

The lecturers confirmed the business theory relevance in a business simulation. The student groups confirmed they had company strategies. After this session the students went to any computer on-site to input their first decisions to the business simulation. The lecturers generated each turn at 8.00am the next morning.

In Session Three lecturers led student discussion about the observation and reflection of the simulation. At this stage the student groups had completed 3 of the 5 turns. This session also provided a troubleshooting forum.

Session Four saw the culmination of this experiential exercise. The final performance results of each company were ranked and discussed. The winning team was awarded their prize of chocolate. Companies were asked to provide feedback on their success or perseverance. A summary of experience was formalised by students completing a questionnaire.

3.2 Observation

Compared to previous simulations used the lecturers observed students showed contagious enthusiasm for the simulation. The deliberate withholding of accessibility to the application in Session One, could have contributed to this enthusiasm.

The lecturers were actively sought out after the formal sessions for student learning advice and simulation gaming advice. Generally the student queries were of a high quality as it was obvious they had comprehended the business theory and wanted to interpret the information generated. They were exploring options such as warehousing the mail order products or fixing a pricing strategy on quality. Few queries were about how to use or navigate the simulation environment.

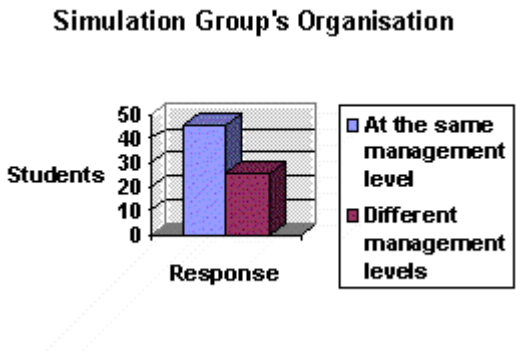
Students frequently asked the lecturers about the company ranking, by performance, that they had achieved at each turn. These students were first asked to reflect on the factors compiling the game. Then in the troubleshooting session (session three) the lecturers listed all 20 companies pricing of their products for one market. Students were then asked to reflect on whether their ranking complied with their strategic expectations.

Groupwork and competitive rivalry focused on business decisions was a positive observation made by the lecturers. Students grouped spontaneously into their companies in the formal sessions and social networking to identify the other companies' members was rife. This was decidedly noticeable perhaps in part due to the SIMplicity feature of renaming your company.

It appeared that the overwhelming response from students to the simulation experience was one of enthusiasm, to the extent that many students wanted to repeat the exercise. It was rewarding for the lecturers involved to see the students gain a deeper understanding of business principles in a fun and interactive way.

3.3 Student Feedback

The response rate for the questionnaire was 94 percent of students who participated. This indicates to some extent the level of group cohesion and buy in to this exercise. Student comments indicate groupwork helped their learning and social skills. Some quotes "..more brains working...helped out people when we felt lost.." indicate clear task roles and maintenance roles.

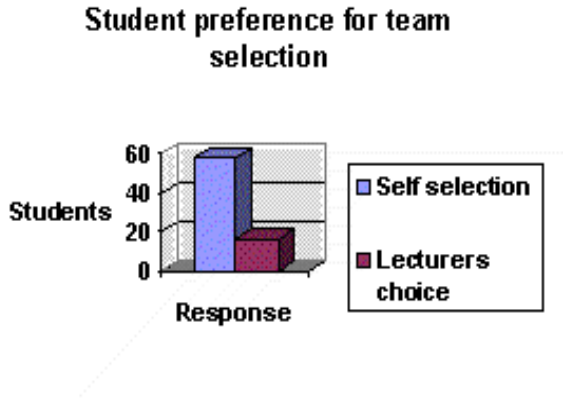


The task roles group members preferred to allocate were at the same management level (see figure 1). Other groups varied the tasks and took on different roles for each turn.

Figure 1. Simulation Groups' Organisation

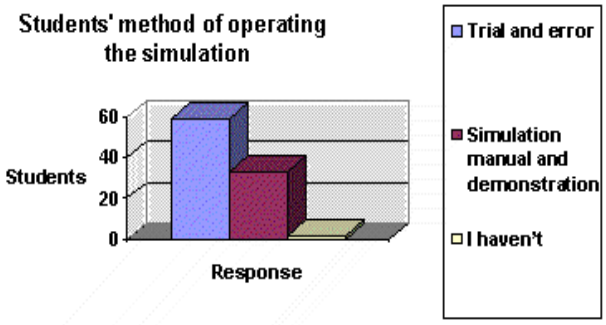
When asked how students would prefer to get into groups 78 percent preferred self selection rather than the lecturers' choice. However, several students commented that random selection was valid as "you don't get to choose your work partners (unless you're the boss)".

Five members for each group were perceived as "about right" by 85 percent of respondents. Student comments strongly stated that greater than five members would be unwieldy in terms of viewing information on screen and making consensus decisions.



Sixty-three percent of students responded that they operated SIMplicity by trial and error. This contradicts the fact that every student was provided with the documentation before accessing the application.

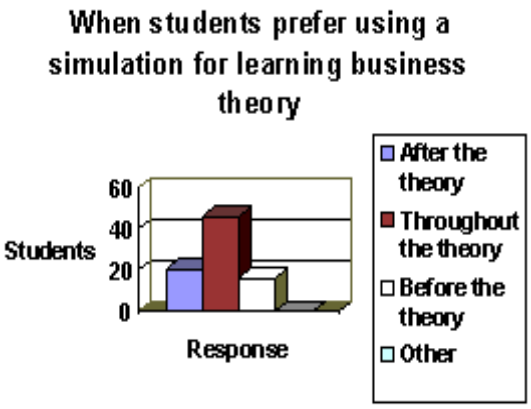
Figure 2. Student Preference for Team Selection



Comments indicated that working from the documentation was good initially to familiarise themselves but trial and error helped them to experiment.

Figure 3. Students' method of operating the simulation

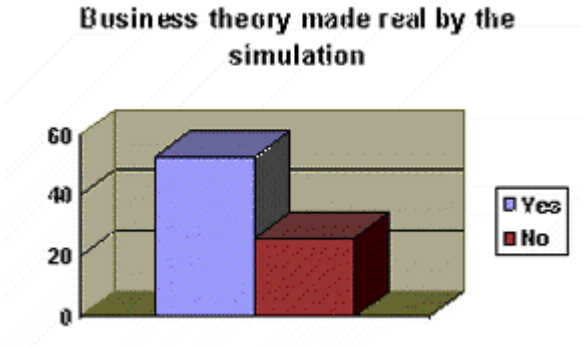
Fifty-five percent of responding students would have preferred to use the simulation during the learning of business theory. Twenty-five percent indicated they



would prefer to take part in the simulation after the theory, with the remaining percentage preferring using the simulation before the theory.

Figure 4. When students prefer using a business simulation for learning business theory.

The positive relationship between the companies formed and the learning experience can be clearly seen in figure 5. Sixty-seven percent of responding students perceived SIMplicity brought business theory to life.



Students commented "make vital decisions...some insight...similar as running your own company, an idea of strategy formulation".

Figure 5. Business theory made real by the simulation.

4. EVALUATIVE REFLECTION

Experiential learning is learning through doing. The Association of Experiential Education, 1995, describes it as a process through which individuals construct knowledge, acquire skills, and enhance values from direct experience. Experiential learning occurs when individuals engage in some activity, reflect upon the activity critically, derive some useful insight from the analysis, and incorporate the result through a change in understanding and/or behaviour (Luckner & Nadler, 1997).

Student learning approaches and the IS lecturer delivery were measured via Kolb's (1984) experiential learning model. Kolb (1984) describes a four-stage, cyclical process of effective experiential learning, which consists of concrete experience, reflective observation, abstract conceptualisation and active experimentation (Hobbs, 1992).

The simulation consisted of five decision periods or turns. Each turn took students through Kolb's learning model. The simulation commenced at the concrete experience stage of the model where students were introduced to and given access to SIMplicity. The lessons plans were designed to allow students to progress to the next stage of reflective observation by providing a forum for discussing the experience and sharing reactions and observations both within their individual companies and with the large group in a formal lecture time. After each turn students were able to move to the third stage of abstract conceptualisation by finding general trends and outcomes from their actions. This enabled them to form reactions for the next stage of active experimentation where they were able to modify or test out new theories for the next turn. This testing generated a new experience and so the cycle began again.

The simulation gave students a greater awareness about the need for communication within their 'company', to draw on each other's skill sets. Taking on different roles, as many participants did, gave them an appreciation for other's points of view. The communication skill set provided by the simulation could lend itself to assessing across other units of learning within an IS degree programme. eg. Information Systems Communication.

From the student feedback received it appears that a significant proportion of students found the simulation helped bring the business theory to life. It has been confirmed in the business arena that playing games is effective in training and preparing employees to thrive in a competitive environment and committing to new processes.

Simulations can also help to gain financial literacy. Trainers have found that accounting principles can be learned thoroughly and cheerfully because a game is less threatening than a lecture course. Simulations can also help to understand synergy in an organisation by learning

the principles of systems thinking - of how the actions of one area affect the function of another and the profitability of the whole company (Brotherton, 1999).

This action research case has had positive results when compared to traditional delivery methods. The following literature raises the strengths and weaknesses of using business simulations as a delivery tool.

Studies on the educational value of business simulations are both wide-ranging and extensive, although often overlooked (Campbell, *et al.*, 1970; Loveluck, 1983). Various summary reviews of business simulations have been categorised into strategic management courses (Faria, 1987), learning environment features (Wolfe, 1990), particular simulations (Wolfe, 1985) and assorted teaching claims (Hsu, 1990). Many of these simulation findings for the teaching of business rest on anecdotal material. Bearing in mind this limitation, the literature reveals how this method fared against traditional methods such as case studies for delivering course material. Studies show superior results for business simulation based groups versus case groups in either course grades, performance on concepts examinations, or goal setting exercises. This fits the lecturers' observations of the students' comprehension of business concepts. Further research is required.

The factors that contribute to the success or failure of the experiential approach concern the nature of the simulation itself, the particular aptitudes and abilities of the business simulation participants and the simulation administration of the lecturer (Toki & Foster, 1999). Wolfe (1990) experimented with three varyingly complex simulations with controlled groups where significant learning was achieved by the upper level and lower level of undergraduate achievers. This indicates the amount of learning and degree of challenge from the business simulation may be more of a function of the students themselves than of the simulation. However, the generally favourable attitude of students towards simulations, which require groupwork, as with SIMplicity, is a contributing factor.

The nature of the simulations reviewed when creating SIMplicity (Kelly *et.al.*, 1999, Toki & Foster,1999) reveals that highly complex variables are required in simulations to aid realism. Students need to comprehend the complex nature of the simulation so they are not tempted to just play to win by 'busting' the simulation code instead of make business decisions. Providing clear documentation of the complex nature of the simulation such as global factors and quality of stock may do this. Initial comments and queries from students in session one mirrored this code-breaking theme. This was planned for and addressed by careful definition of business simulations by the lecturers and informing the students on SIMplicity's complex algorithms created to simulate the real world of mail order retail business.

How the lecturer creates the companies within the simulation, places the game within the context of a course and rewards and interacts with the students playing the business simulation has limited literature. Throughout the experiential learning process it was critical that the lecturers exercised monitoring functions so as to maximise learning and minimise undue distress. Considerable skill was required to be effective as an experiential lecturer. A high level of comprehension of the theoretical background in addition to the practical experience that students are involved in was required. There was a need to be sensitive and responsive to the subtle differences of the learning process within individuals and confident in managing group processes (Hobbs, 1992). Some lecturers employed self-selection to make groups assuming this promotes and immediate high level of group cohesion (Wolfe, 1985). This was evident from observation and student feedback to be the case. The reward, stated in session one to students, did not seemingly induce students to perform.

5. CONCLUSION

The success or failure of the team's economic performance and the overall setting in which the business simulation was used were contributing factors to the students' favourable reception to this simulation. Student learning of business concepts was improved from previous traditional delivery of business theory. This is a reflection of the careful lesson development and delivery when using such a tool.

Models describing options for lecturer intervention, by level of student and course discipline such as IS strategic management are areas of business simulation gaming that may be explored further. The kind and quality of feedback that is most appropriate, given game complexity choice and instructor involvement models, requires more research. Further information is needed about the efficacy of rewards on business simulation performance of groups and group learning. Further areas of research may involve various combinations of teaching methodologies with SIMplicity.

6. ACKNOWLEDGMENTS

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