Using the markstrat business simulation to develop strategic management behaviours

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Abstract

It is well understood that experiential learning provides an incentive and impetus for accelerated learning, especially in humanities and business-focussed studies. ICT-based synthetic and virtual environments can provide a rich and varied context within which to achieve this. Specifically, this paper attempts to provide empirical, survey-based analysis of the application of a business simulation game, MarkStrat, on undergraduate and postgraduate programmes in this vein. The paper subsequently posits the pedagogic benefit of using such business simulation games for the development of strategic management behaviours across student sample populations and derives subsequent results to highlight associated learning behaviours.

Keywords: Business Simulation, Business Game, Strategic Management, Pedagogy

1 INTRODUCTION

In our contemporary digital economy, we have become used to using computers and information systems to interact with others as a matter of course. Witness the exponential usage of email, messaging and collaboration services since the dot-com boom of the late 20th century. At the same time, the world has seen the phenomenal growth and development of the computer game industry, where simulations and virtual worlds have become endemic components of people's individual lifestyles (both offline as well as online). These games have now become socially acceptable forms of entertainment, astonishingly now also rivalling the worldwide film industry, since they reflect the intensity of individual and social relationships, collaboration and interactions. This is even more evident in terms of the emergence of massively multiplayer online role-playing games (MMORPGs) in recent years, which have provided a new level of immersive and interactive environments for gamers never seen before (such as World of Warcraft, Second Life, Ultima Online, Everquest and EVE Online).

These modern games are presented through the use of virtual avatars which exist inside a synthetic yet dynamically interactive, evolving three-dimensional virtual environment. Indeed there is widespread agreement that as such environments become ever more complex, the line between the virtual and physical world will become blurred. In this light, electronic games and simulations have also played a useful role in developing managerial and leadership qualities on business management development programmes, for the past three decades. Examples of such software including MarkStrat, Executive and CapSim abound – and there are many more which lay claim to be unique "business games" which can be used as learning tools. As such, these "serious games" are seen to have played a useful role in developing managerial and leadership qualities due to their ability to represent useful corollaries to business and management decision-making scenarios (such as marketing and new product development strategies).

However, business simulation games have progressed very slowly and have rarely utilised sophisticated, graphical methods of interaction, as compared with the current state-of-the art in the consumer field as described above. Compounded with this is the realisation that serious (as well as "ordinary") computer games do have an effect on learning modes of decision-making in terms of assisting in the development of problem solving, co-operative and collaborative behaviour – although it is not clearly understood why and where this occurs within individuals and groups. This is particularly the case in the context of using gaming for management education and learning.

Experiential-based learning is well known and understood to be of use in learning situations where the acquisition of knowledge alone is not enough. This is especially true within and for business education where learning by doing is limited to traditional classroom setups. Within the spectrum of student-focussed learning methods (Fry *et al.*, 2000) within undergraduate and postgraduate business programmes, there are many and varied approaches taken. These range from standard / othodox lectures, through case studies, directed self-learning, group work, role plays, contextual visits and business simulations. Of the former half of these the majority, whilst well known and understtod in practical and philosophical terms are somehwat limited in scope and flexibility to cover all combinations of learning outcomes and business situations. In the latter cases, the opportunity to explore and learn experientially, either from close interpersonal interaction in teams, empathy via roles or through direct exposure to a real business activitiy, is grealy enhanced and supports the positive student experience. However, in these cases, the student is an observer and not an active participant in real business or causally-linked situations and scenarios which include and engender effect and feedback.

Business simulation games on the other hand provide an expansive view of the complexity of a business situation, where students have a chance to take and implement decisions and see their consequences, within a longitudinal (though time-boxed) timeframe. Althrough enabled via information and communication technologies (ICT), such an approach is limited in the sense that nothing can replicate true responsibility and accountability than active business experience in the real world. Clearly an abstracted synthetic reality still limits and distorts the reality of actual business contexts – notwithstanding the logistics of implementing, supporting and maintaining such sophisticated environments for learning. Hence, probably the best learning effects are achieved when these three methods are flexibly combined. The use of all these methods, at different stages of the teaching process, allow the students to achieve a multi-dimensional vision of the real-life business process, and of the challenges raised by decision-making and implementation in a high-risk, unpredictable environment. Used in combination, the advantages of these methods complement each other, enriching students' experience and facilitating understanding.

Hence, this paper investigates running a successful off-the-shelf business simulation package with undergraduate students across a range of business and management courses within the UK. The data presented and analysed in the paper were collected during two consecutive years of organising and co-ordinating the MarkStrat simulation in the form of a series of weekend residential courses, within the U.K, and builds upon the work of Gurau and Ranchhod (2004). During this period, the simulation was run both for members of staff and for third year students, as a part of a Strategic Marketing module. To highlight the findings of this study, a number of propositions are formulated regarding the best practice in organising the Markstrat simulation via analysis of survey results.

2 BUSINESS SIMULATION GAMES

Considering the rapid evolution of modern pedagogy, as well as the quick development of newer, more complex simulation applications, the research presented in this paper has an important significance, both for professors and for teaching organisations. Besides the need to master the technological aspect of this development, the coordination of the teaching process is changing,

becoming more dynamic and decentralised. The professor/tutor does not represent the knowledge creator any more, but rather is now becoming a learning *facilitator*, who empowers the students and indicates the sources of information that have to be accessed, interpreted, and combined in order to answer to complex role situations. The challenges raised by these new pedagogical procedures require creative solutions within higher education in order to enhance the effectiveness of the teaching process. Hence, the evolution and development of business simulation games has been an area of growing interest over many years.

2.1 Games and computer-based IS simulations: the development of learning tools

Smith (2007) highlights the evolution and development of games as creative and stimulating decision-making vehicles for advancing and developing problem solving skills over many years. Specifically, the advent of the personal computer and associated information and communication technologies has meant that the development of synthetic and virtual environments to mimic real-world scenarios and situations has progressed to the stage where the concept of "simulating" complex decision situations, is now becoming commonplace. Although such technologies were initially limited to research and development, then the defence sector, and famously the aviation sector (flight simulators for pilot training), the pace of consumer technologies has thus brought the immersive into the living room (Smith, 2006). However, the one area which has been slow to take up the notion of simulation as compared to these fields is business management and education. The idea is not new, and has been emergent from as far back as when Lucas *et al*. (1974) highlighted the potential benefit of such systems for teaching within a US graduate school in the mid-1970s – and before that still into the 1950's. As Rollier (1992), and Alpert (1993) note, computing technology and information systems have been available to such an extent as to provide useful contexts for facilitated management learning. But even in 1993, there was a high level of anxiety and cautiousness about the technological overheads and pedagogical implications of "giving up" the teacher-student medium to computers wholly.

However, over time academic lecturers as well as trainer-facilitators have been gradually getting to grips with the technological issues as information systems have advanced, and marketing simulation games in particular have kept in step with these advances – from dedicated systems, to discs, to client-server to the current internet based service delivery mechanisms (Fritzsche and Burns, 2001; Keys and Wolfe, 1990). The field does still have some way to go to adopt these mechanisms as formal and effective addenda to teaching methods, with the promotion and understanding of where and how such games can be used – and not being limited to the core area from where they have emerged, such as from within the field of marketing (Faria and Wellington, 2004). Within this context the paper now proceeds with a focus on a well known business simulation game, MarkStrat.

2.2 A business game in focus – MarkStrat

This study focuses on the application of a well-known business simulation game package, MarkStrat, to investigate the pedagogical outcomes for strategic management development in this light. MarkStrat, has been in use for over 25 years and continues to be the worldwide leader of interactive marketing simulations in education, having been used at more than 500 educational institutions across a wide range of undergraduate and postgraduate courses throughout the world (Markstrat, 1997). The simulation software itself arose out of a pedagogic desire to increase and improve the efficiency and reflectivity of understanding strategic decision-making behaviour within the focal area of marketing; also addressing the need to apply theoretical strategic concepts (portfolio mix, market analysis, corporate strategy, market research, forecasting, team planning and inter-team dynamics) in a "safe" simulated environment (Larreche and Gatignon, 1990a).

The philosophy and rules for the system are quite straightforward and involve teams of (students) competing against each other under semi-realistic synthetic business conditions, to design, innovate, brand and market a set of products across two markets in an artificial world with a given budget and a target to maximise shareholder returns (Burns, 1997; Gatignon, 1987). As such, MarkStrat requires participants to consider not only a simulated market but also real, human competitors who are interacting and setting business strategies, enabled through the MarkStrat interface. In doing so, the platform itself essentially provides a suite of decision-making and forecasting tools available as a suite of "management dashboards" such that each team attempts to meet the needs of five different (virtual) consumer groups. Thus, performance depends not only on the quality of internal company decisions but also on the market behaviour of competitors, annualised returns – and indirectly, the dynamics and harmonics of inter- and intra-team competition.

The game progresses through a series of upto 12 – 15 virtual "rounds" over a period of 3 – 4 days, whereby each team – hence company – have to make strategic decisions on product R&D, production, market research, HR costs, distribution and so forth. The central game management console collects all decisions from all groups on a periodic basis, and uses them as inputs to the simulation process. After the simulation is run for a relevant period of time, the game management site transfers the output to all groups whereby an overall set of management reports is made available to all to track competitive performance drivers (including shareholder price, rate of inflation, product drift, consumer satisfaction and other indices). The simulation output consists of a marketing budget for the next period and the result of marketing studies purchased by each group in the last period. Hence the main task of each group is to realise a qualified decision making process that enables a smooth balance between the offer of prospected products and the demand of the market. Only by considering all relevant market conditions it is possible to achieve a high net marketing contribution. The key steps are shown in Table 1.

Phase	Tutors	Students
Preliminary setup	▪ Organise and setup teams and "worlds" ▪ Define objectives and duties of students ▪ Release simulation access to students ▪ Briefing on marketing issues and strategy topics	▪ Familiarisation with MarkStrat
Simulation Round	▪ Release previous or current team/world results ▪ Brief and cover key marketing or strategy topics of use to students to enable decision-making ▪ Support and answer general or specific queries	▪ Review released team / world results ▪ Organise and take team decisions ▪ Input team decisions into MarkStrat and upload
Post-simulation	▪ Feedback and analysis of results (identify winning team) ▪ Highlight learning outcomes for marketing and strategy topics	▪ Preparation of submittable assignment on the performance of their respective team and simulation and module objectives

Table 1. A typical MarkStrat business simulation game session

The platform itself comprises of a combined thin-client internet based console which is downloadable to any computer anywhere in the world through which students and tutors can access and make and review decisions. All game decisions and outputs are then uploaded by each team and calculated centrally via the internet back to a main MarkStrat server, which houses the simulation engine. The results are then retrieved by the tutor and distributed to each team in a reverse manner. In the context of using MarkStrat as a tool for teaching marketing and strategy topics on business and management courses, the approach used by the authors and tutors has generally been to run the simulation sessions over a period of 12 rounds, over 3 days as a residential (i.e. offsite) course, fewer periods also work (Redmond, 1989). This has the benefit of providing students and tutors with a controlled and focussed

working environment, where all energies can be devoted to a realistic set of team interactions identified through the pursuit of attaining the goal of achieiving maximum shareholder return. Since the current incarnation of MarkStrat is through internet technologies, running the simulation is therefore also not restricted to geography or timezone constraints and could quite easily be run as a distance-learning set of sessions (although this then requires additional logistical and supervisory overhead to co-ordinate teams, tutors and information).

2.3 Simulation as a learning tool

Within MarkStrat, the participating students are effectively "learning-by-playing", and are goal-seeking in terms of analysing a complex decision-making process through breaking down their overall objective into a series of marketing strategy sub-tasks and targets – successful branding, marketing, consumer satisfaction, lean inventory management and the like (Lant and Montgomery, 1992). Furthermore, they are learning to work within a team and to react quickly to an unpredictable evolution of the pseudo-market driven by a combination of other team interactions within the simulation – as well as "God"-like interventions presaged by the MarkStrat tutors (such as arbitrarily adjusting the inflation rate and / or introducing new product and market varieties).

A such, this type of environment approximates to the well-known Kolb Learning Cycle (Kolb, 1984; Fry *et al*, 2000), fitting into the spectrum of work-based learning, teaching laboratory and practical work, action-learning, role-playing, and many associated types of small group teaching (Fry *et al*., 2000). Information Systems-based business simulation games such as MarkStrat can then be defined as experiential learning tools, whereupon concepts, theories and constructs to be learnt are not fixed but are formed and re-formed through the 'experience' and knowledge of individual participation (Coles, 1998; Race, 1994 and 1996). It is interesting to note that upon engaging in a MarkStrat simulation session, the key stages of the experiential learning process are addressed and achieved, albeit through a range of different learning styles, as Wolf and Kolb (1984) note. Further, and as shown in Table 2, such business simulation games provide a range of learning aspects which can assist in understanding personal development (Tonks, 2002) and can then also be related to the transfer of knowledge (Nonaka and Takeuchi, 1995) and associated behavioural learning styles (Honey and Mumford, 2000)

Experiential learning aspect (Wolf and Kolb, 1984)	**Knowledge aspect (Nonaka and Takeuchi, 1995)**	**Learner behaviour (Honey and Mumford, 2000)**	**MarkStrat session components**	**Identifiable Component**
Abstract Conceptualisation and Active Experimentation	Socialisation	Activist	Practical application of marketing strategy within the game	Process
Concrete Experience and Reflective Observation	Combination	Thinker	Development of product and market strategies to aid decisions	Learning Opportunity
Abstract Conceptualisation and Reflective Observation	Internalisation	Reflective	Making decisions to address product, market, and macro-economic results	Implementation
Concrete Experience and Active Experimentation	Externalisation	Pragmatist	Implementing decisions, and assessing competitor team response in each simulation round	

Table 2. Range of learning styles and behaviours arising from MarkStrat

3 RESEARCH APPROACH AND DATA ANALYSIS

3.1 Research methodology and design

Given the previous background, the remainder of this paper provides data and analysis of results from student responses for after engaging in MarkStrat sessions. Hence the approach developed for this research was to extend understanding of those components of learning to identify if strategic behaviours were being experienced by students and to see if the range of learning identified in Table 1 could be used to usefully understand the effect of MarkStrat as a learning tool. The research methodology involved the application of a quantitative survey which was presented to a number of cohorts of UK-based undergraduate students studying marketing and corporate strategy within a business and management degree. Using a sample size of n = 210 students, the coded questionnaire based upon an ordinal numerical Likert scale of 1 -7 shown in Appendix Table 1 (where 1 denotes "Not at all", 5 denotes "Somewhat" – or neutral - and 7 denotes "A lot") was collated and analysed, the results being analysed using simple descriptive and correlative statistics.

The survey form data was likewise coded along four principle components of 'Process' (9 components, P1-P9), 'Opportunity for learning' (8 components, OL1 – OL8), 'Implementation Issues' (5 components, II1 – II5) and 'About the Environment' (5 components, AE1-AE5).

3.2 Analysis of data

Several levels of descriptive statistical analysis have been undertaken on the data as collected with respect to the responses to the survey and are detailed as histograms of mean and standard deviation responses in Figure 1 and Appendix Table 3; internal reliability, correlation and a measure of the Spearman r-correlation amongst responses in Table 4. All analyses were carried out using the PASW statistical package (i.e. SPSS) and with reference to standard statistical knowledge (Field, 2005).

3.2.1 Mean and Standard Deviation

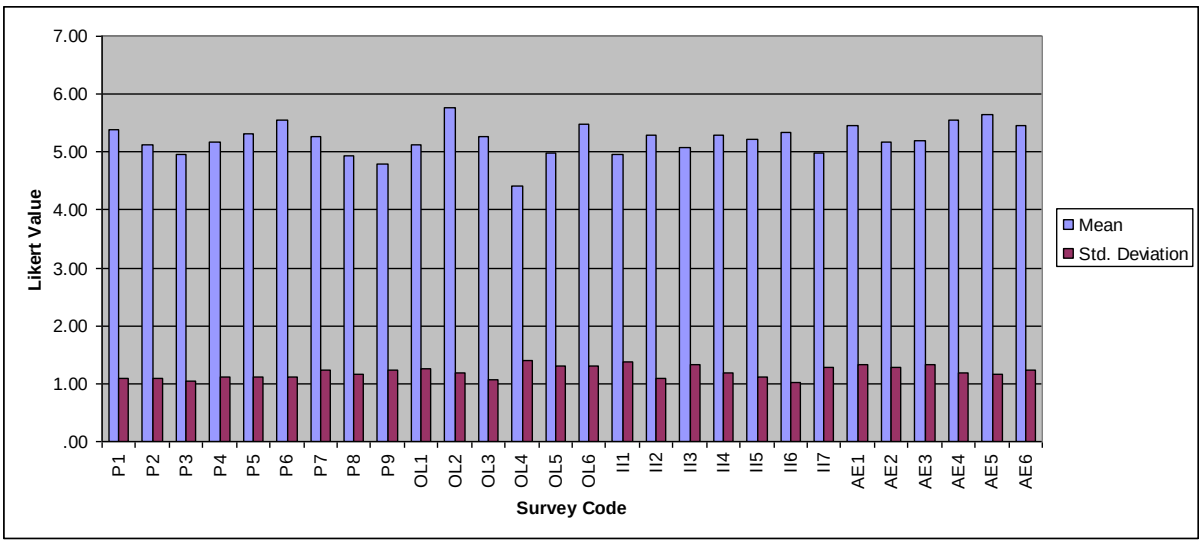

Figure 1. Mean and Standard Deviation for all responses

The responses in Figure 1 show that for the statistical mean response across all of the 210 students surveyed, the average was a reply of 5.22 (with a standard error of 0.08), denoting slightly above average and favourable experiences of using MarkStrat for developing and exploring marketing and strategy concepts. In terms of the standard deviation, this also shows that there was little reversion from the mean (which was 1.20, with a variance of 1.45) denoting a high degree of clustering around these slightly above average responses. Taking a look at each of the coded components in Table 3, shows that the responses are similar across all components of the survey – across Process, Learning, Implementation and Environment issues highlighting a consistent experiential learning experience with a low level of deviation in general across all of these perspectives. As such the lowest deviation for 'Process' components (1.15) appears to show that the package was able to provide support for learning those marketing, strategic, pricing, operations and financial aspects of business.

Whilst the 'Opportunity for Learning' shows the highest standard deviation (1.358) denoting a wider variation against learning outcomes in terms of whether students were able to evaluate and recognise gaps in their knowledge. There was less variance of responses relating to the 'Implementation Issues' and usage of MarkStrat for learning in groups and increasing the capacity for teamwork and information processing. Similarly for 'Environment' issues, there was a consistently higher than component average (5.33) for what the simulation exercise afforded students in terms of an immersive learning environment – thus signifying the concretisation towards the end of the Kolb cycle here.

	Component			
Measure	P1-P9	OL1-OL8	II1-II5	AE1-AE5
Min	1	1	1	1
Max	7	7	7	7
Average	5.16	5.15	5.17	5.33
Std Dev	1.158	1.358	1.200	1.284

Table 3. Descriptive statistics across for each MarkStrat component

This is further seen in detail in Appendix Table 2, where students identified:

- They were able to understand how pricing worked (P6, average of 5.54) more than understanding how to manage information (P8, average of 4.93);
- They were largely confident that they were able to take realistic risks without direct "fatal" consequence (OL2, average of 5.77) but appreciated it was not such a realistic environment (OL4, average of 4.41);
- They were able to learn how to process information better as a result of this business simulation game exercise (II4, average of 5.34) although were not able to identify how to transfer such skills to other parts of their management course (II5, average of 4.98);
- Understood that this form of experiential learning requires total immersion in the course (AE5, average of 5.65), although they were slightly lower expectations about whether or not such simulation game-based learning experiences were conducive to learning effectively (II3, average of 5.18).

3.2.2 Internal Consistency and Correlation

The computed reliability coefficient (Cronbach's Alpha) is computed as $\alpha = 0.969$ showing that the ordinal scale applied and use was internally consistent and appropriate for the survey conducted, and compares very well with typical thresholds being within the range, $\alpha = 0.5$ to $\alpha = 0.7$. In terms of correlations between the variables and the responses, Table 4 shows the Spearman 2-tailed correlation data (hence chosen as the direction of association is unknown, but ranked within the components that were surveyed). Immediately it is apparent that a proportion of the dataset have high correlative factors. This shows non-significant and non-linear relationships across 4% of the 784 datapoints across variables: P1-P2, P2-P7, P3-OL5, P4-P5, P5-P6, P6-P7, P7-P8, P8-P9, P9-OL8, OL1-OL3, OL2-AE2, OL3-OL5, OL4-OL5, OL5-AE6, OL6-AE3, OL7-AE3, OL8-II1, II1-II5, II2-II3, II3-II4, II4-II5, II5-AE2, AE1-AE2, AE2-AE6, AE3-AE4, AE4-AE6. This shows that there were no correlations amongst nearly all of the major components. However, there was some scant evidence in the correlation that there were any significant linear relationships at all, where significant correlations existed at the 0.05 level for P3-OL2 (strategic perspective versus taking risks that could not be taken in business), and P3-AE5 (theoretical foundations for market behaviour versus learning requiring total immersion in the exercise) only.

4 CONCLUDING REMARKS

The Markstrat simulation represents one of the most effective ways to confront students with real-life business situations, offering them the possibility to apply their theoretical knowledge, to interact with other people, and to take responsibilities for implementing business decisions. All these aspects of the Markstrat exercise determine the development of essential skills, at theoretical, practical, individual and inter-personal levels. This paper has investigated the use of such a business simulation game for undergraduate teaching, through the analysis of a user-based survey.

The survey responses found that on average most students viewed the business simulation game experience as "somewhat" effective, being slightly higher than average on the ordinal Likert scale of 1-7 (with a dataset average of 5.22 across the sample of 210 students). The remainder of the descriptive statistics highlighted a positive view on how the students understood core marketing, strategy, operations management and macro-economic principles (such as those relating to pricing, customer satisfaction etc) – and the fact that the simulation itself afforded a "safe" environment to take pseudo-business risks with a level of immersion which the students also found to be conducive to learning.

The dataset correlations ultimately showed a level randomness in the data– denoting that the survey lacked a design which could have picked up learning themes better. There was some correlation showing that students may have tended to understand the importance of taking a strategic approach to marketing decisions and balancing this with taking realistically viable risks (i.e. the P3-OL2 vector). Also there may have been a correlative effect between students understanding the theoretical underpinnings of market strategies as a result of being immersed in the simulation game (i.e. the P3-AE5 vector). Hence in terms of the range of learning styles discussed via Table 2, the authors suggest that this sample of students using MarkStrat, may have exhibited in the latter correlation a quotient of what Honey and Mumford might term "activist" behaviour (i.e. that synonymous with the Kolb-based abstract conceptualisation and active experimentation phase, and the Nonaka and Takeuchi component of socialisation). In addition, the former correlation vector also potentially highlight the "reflective" learning behaviour (i.e. that synonymous with the Kolb-based reflective observation and the Nonaka and Takeuchi component of Internalisation). Therefore, this research suggests that there is some support for identifying such a business simulation game platform to enable and develop strategic management behaviours.

However, it is clear from this empirical research that the sample size and investigation across the four principle components needs to be extended, and possibly to include other student populations at other institutions. Variances may exist within the form of delivery method of the MarkStrat course analysed also (residential course) and it would be useful to compare these results with delivery types such as distance learning and long-term (weeks and months versus days). The survey also does not highlight the IT proficiency of the learners either, which would be a key marker for identifying the rate of learning and ability to assimilate information speedily. However the data did show that on average, there was a 7.7% increase in the capability to handle information and process it as a result of the exercise (an average of 4.93 out of 7 before the exercise versus 5.34 out of 7 following the exercise). The knowledge transfer between teacher and student in terms of the adult-child and adult-adult and facilitator-learner relationships is also important and worthy of attention and has not been addressed within the scope of this research. This might underpin the development of pedagogic teaching styles to address the "thinker"-"pragmatist" learner behaviour roles (which the authors believe may well be prevalent in specific managerial segments of organisations, for example technical managers). Clearly, development of new improved gaming environments is key too and also an area of interest to the researchers – and certainly the usability aspect here may well be driving the positive responses to the level of immersion and understanding of management concepts that appear to be emerging from this analysis.

References

Alpert, F. (1993). Large-Scale Simulation in Marketing Education. Journal of Marketing Education, **15**: 30-35.

Burns, A.C. (1997). Review of MARKSTRAT3. Marketing Education Review, **7** (1) : 89-90.

Faria, A.J., and Wellington, W.J. (2004). A Survey of Simulation Game Users, Former-Users, and Never-Users. *Simulation Gaming*, **35** : 178-207.

Field, A. (2005). *Discovering Statistics Using SPSS*. Sage Publications.

Fritzsche, D.J., and Burns, A.C. (2001). The Role of ABSEL in the Development of Marketing Simulations in Collegiate Education. *Simulation Gaming*, **32** : 85-96.

Fry, H., Ketteridge, S., and Marshall, S. (2000). Understanding Student Learning. In Fry, H., Ketteridge, S., and Marshall, S, (eds.) *A Handbook for Teaching and Learning in Higher Education*, London: Kogan Page, pp.21-40.

Gatignon, H. (1987). Strategic Studies in Markstrat. *Journal of Business Research*, **15** (6), 469-480.

Gatignon, H. (1997). *Introducing Markstrat3*. Available. [on-line]. http://www.insead.fr/~gatignon/Markstrat.html.

Gurau, C. and Ranchhod, A. (2004) Computer-enabled Marketing Education: The Implementation of the Markstrat Simulation Exercise, *International Journal of Learning*, **12** (11) : 165-178

Honey, P. and Mumford, A. (2000). *The learning styles helper's guide*. Maidenhead: Peter Honey Publications Ltd

Keys, B., and Wolfe, J. (1990). The Role of Management Games and Simulations in Education and Research, *Journal of Management*, **16** (2) : 307-336.

Kolb, D.A. (1984). *Experiential Learning*. Englewood Cliffs: Prentice-Hall.

Lant T. K., and Montgomery D. B. (1992). *Simulation Games as a Research Method for Studying Strategic Decision Making: The Case of MARKSTRAT*. Stanford GSB: Research Papers, Available. [on-line] http://gobi.stanford.edu/researchpapers/detail1.asp?Paper_No=1242.

Larreche, J-C., and Gatignon, H. (1998). *Markstrat3: The Strategic Marketing Simulation*. Cincinnati: South-Western College Publishing, Ohio.

Larreche J-C., and Gatignon H (1990a). *Instructor's Manual: Markstrat - A Marketing Strategy Game*, Palo Alto: The Scientific Press.

Larreche J-C., and Gatignon H (1990b). *Markstrat - A Marketing Strategy Game; Participant's Manual*. Palo Alto: The Scientific Press.

Lucas, H.C., Montgomery, D.B., and Larreche, J.C. (1974). A study of computer use in a Graduate School of Business. *Communications of the ACM*, **17** (4) : 205-206.

Meixner, O., and Haas R. (1998). Experiences with the use of new information and communications technology in marketing education - an Austrian case study. In *Euromedia '98. Featuring WEBTEC - MEDIATEC - APTEC, Euromedia Conference*, Leicester, GB, 5.-7. January, pp.204-210.

Nonaka, I., and Takeuchi, H. (1995). *The Knowledge-creating Company : How Japanese Companies Create the Dynamics of Innovation*. Oxford University Press: Oxford, UK.

Race, P. (1994). *The Open Learning Handbook*. 2nd edition. London: Kogan Page.

Redmond, W. (1989). On the Duration of Simulations: An Exploration of Minimum effective length., *Journal of Marketing Education,* **11**:53-57.

Rollier, B. (1992). Observations of a Corporate Facilitator, *Simulation Gaming*, **23**: 442-456.

Strat*X (1997). *Simulation as a learning method*. Available. [on-line] http://cross.net/strat*x/sims.htm.

Smith, R. (2006). Technology disruption in the simulation industry. *Journal of Defense Modeling and Simulation*, **3** (1) : 3 – 10.

Smith, R. (2007). Game Impact Theory: the Five Forces that are driving the adoption of Game Technologies within Multiple Established Industries. *Games and Society Yearbook*. Available. [on-line]. http://www.modelbenders.com/papers/Smith_Game_Impact_Theory.pdf. Accessed 6th May 2009.

Tonks, D. (2002). Using Marketing Simulations for Teaching and Learning: Reflections on an Evolution. Active Learning in Higher Education, **3** (2) : 177-194.

Wolf, D.M., and Kolb, D.A. (1984). Career development, personal growth and experiential learning. In D. Kilb, I. Rubin, and J. McIntyre (eds.), *Organisational Psychology: readings on Human Behaviour*. 4th edition. Englewood Cliffs: Prentice-Hall.

APPENDIX

Question	Response						
	1	2	3	4	5	6	7
Process: *"When working with MarkStrat, did you manage to understand the following?"*							
P1. Market Competition							
P2. A Strategic Perspective							
P3. Theoretical foundations of Market Behaviour							
P4. Marketing Communications							
P5. Distribution							
P6. Pricing							
P7. Product Management							
P8. Managing Information							
P9. Financial issues							
Opportunity for Learning: *"MarkStrat gave me the opportunity to…"*							
OL1. Experiment with Marketing ideas							
OL2. Take risks I could not take in a real business							
OL3. Experience a range of Marketing activities							
OL4. Work in a realistic environment							
OL5. Evaluate the success of particular strategies that were adopted							
OL6. Learn issues that I would not normally have picked up in a classroom situation							
OL7. Recognise the difference between tactics ans srtategies							
OL8. Learn to analyse information more effectively							
Implementation issues: *"On the basis of this exercise I feel that…"*							
II1. I will be able to use the skills absorbed in business future jobs							
II2. I will be able to work more effectively in groups							
II3. I will be able to critically evaluate marketing data							
II4. I will be able to use information more effectively							
II5. I will able to use the skills gained in other parts of the course							
About the Environment: *"This type of learning environment…"*							
AE1. Motivated me to want to succeed in the simulation							
AE2. Motivated me to learn about business and marketing strategies							
AE3. I find this type of experience conducive to learning effectively							
AE4. I find a competitive environment helpful in learning marketing and business issues							
AE5. This type of learning requires total immersion in the exercise							

Appendix Table 1. MarkStrat coded questionnaire summary

	P1	P2	P3	P4	P5	P6	P7	P8	P9	OL1	OL2	OL3	OL4	OL5	OL6	OL7	OL8	II1	II2	II3	II4	II5	AE1	AE2	AE3	AE4	AE5
Min	2	2	2	2	2	2	1	1	1	1	1	2	1	1	2	1	2	1	2	2	2	1	1	1	1	1	2
Max	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Average	5.38	5.13	4.95	5.18	5.29	5.54	5.25	4.93	4.79	5.13	5.77	5.26	4.41	4.98	5.47	4.94	5.28	5.07	5.28	5.20	5.34	4.98	5.44	5.15	5.18	5.56	5.65
Std Dev	1.09	1.10	1.03	1.13	1.14	1.12	1.23	1.17	1.23	1.26	1.17	1.07	1.39	1.31	1.30	1.39	1.09	1.34	1.20	1.12	1.01	1.29	1.34	1.30	1.36	1.18	1.15

Appendix Table 2. MarkStrat coded questionnaire summary

	P1	P2	P3	P4	P5	P6	P7	P8	P9	OL1	OL2	OL3	OL4	OL5	OL6	OL7	OL8	I1	I2	I3	I4	I5	AE1	AE2	AE3	AE4	AE5
P1	1.000																										
P2	.653**	1.000																									
P3	.524**	.527**	1.000																								
P4	.344**	.243**	.454**	1.000																							
P5	.457**	.297**	.354**	.517**	1.000																						
P6	.464**	.402**	.363**	.329**	.491**	1.000																					
P7	.524**	.627**	.458**	.381**	.351**	.521**	1.000																				
P8	.538**	.513**	.395**	.408**	.359**	.369**	.618**	1.000																			
P9	.398**	.505**	.373**	.319**	.289**	.448**	.508**	.538**	1.000																		
OL1	.397**	.362**	.416**	.326**	.414**	.465**	.440**	.391**	.392**	1.000																	
OL2	.266**	.205**	.169*	.200**	.314**	.339**	.300**	.302**	.151*	.343**	1.000																
OL3	.346**	.331**	.407**	.423**	.378**	.389**	.450**	.374**	.311**	.547**	.353**	1.000															
OL4	.319**	.362**	.352**	.292**	.317**	.250**	.357**	.290**	.272**	.410**	.160*	.464**	1.000														
OL5	.449**	.485**	.484**	.373**	.442**	.442**	.471**	.514**	.389**	.484**	.260**	.494**	.632**	1.000													
OL6	.421**	.429**	.274**	.355**	.321**	.304**	.477**	.481**	.333**	.414**	.214**	.441**	.503**	.607**	1.000												
OL7	.438**	.458**	.318**	.261**	.361**	.317**	.379**	.367**	.347**	.385**	.224**	.383**	.330**	.483**	.504**	1.000											
OL8	.514**	.461**	.452**	.402**	.410**	.420**	.413**	.526**	.469**	.469**	.266**	.423**	.403**	.569**	.492**	.469**	1.000										
I1	.535**	.473**	.440**	.383**	.404**	.401**	.551**	.508**	.394**	.445**	.258**	.486**	.555**	.619**	.558**	.523**	.640**	1.000									
I2	.403**	.335**	.202**	.284**	.316**	.295**	.408**	.383**	.280**	.276**	.235**	.309**	.248**	.391**	.391**	.301**	.360**	.504**	1.000								
I3	.455**	.485**	.398**	.354**	.391**	.350**	.467**	.475**	.414**	.379**	.257**	.447**	.420**	.556**	.488**	.457**	.636**	.644**	.519**	1.000							
I4	.487**	.472**	.418**	.433**	.413**	.355**	.491**	.465**	.434**	.463**	.250**	.434**	.454**	.562**	.516**	.529**	.593**	.669**	.471**	.750**	1.000						
I5	.404**	.487**	.391**	.329**	.373**	.407**	.549**	.467**	.416**	.439**	.224**	.394**	.552**	.617**	.598**	.517**	.514**	.698**	.390**	.610**	.646**	1.000					
AE1	.442**	.418**	.348**	.286**	.332**	.294**	.413**	.387**	.351**	.382**	.337**	.322**	.447**	.422**	.450**	.426**	.405**	.494**	.302**	.396**	.435**	.429**	1.000				
AE2	.493**	.452**	.390**	.316**	.323**	.315**	.477**	.427**	.296**	.445**	.363**	.492**	.477**	.536**	.591**	.482**	.496**	.602**	.378**	.554**	.512**	.535**	.629**	1.000			
AE3	.602**	.548**	.398**	.346**	.415**	.339**	.472**	.511**	.378**	.447**	.297**	.435**	.525**	.593**	.660**	.544**	.515**	.633**	.437**	.480**	.565**	.520**	.570**	.640**	1.000		
AE4	.485**	.473**	.433**	.273**	.294**	.280**	.401**	.527**	.347**	.404**	.302**	.361**	.374**	.545**	.559**	.405**	.517**	.527**	.373**	.495**	.523**	.450**	.578**	.587**	.741**	1.000	
AE5	.336**	.300**	.184*	.291**	.143	.130	.228**	.290**	.133	.281**	.214**	.270**	.254**	.292**	.456**	.408**	.336**	.396**	.232**	.321**	.393**	.308**	.449**	.423**	.538**	.514**	1.000
AE6	.527**	.513**	.431**	.331**	.375**	.377**	.571**	.499**	.441**	.487**	.265**	.464**	.565**	.648**	.630**	.527**	.565**	.693**	.464**	.549**	.590**	.582**	.608**	.710**	.721**	.617**	.444**

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Appendix Table 3. Spearman correlation matrix across all responses