



Learning from a Business Simulation Game: A Factor-Analytic Study

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Abstract. Learning is an active self-directed experience of the individual that changes her thinking and behaviour. A simulation game offers multifaceted learning experience to its players because it produces critical thinking skills and knowledge from their interactions with others and from their reflections of their actions and outcomes. To understand what business issues could be learned in a simulation, a 20-item instrument was developed and statistically tested on post-graduate management students in a business simulation game. The analysis of their responses showed that the game provided them with deep understanding of business goals, competitiveness and collaboration, and awareness of business and selling skills. This game covered the critical subjects of the business management course. The relevance of the findings for research and application have been discussed.

Keywords: Business goal orientation · Business skills · Collaborative action · Competitiveness · Experiential learning · Sales function · Simulation game

1 Introduction

Learning is the process that changes the perspectives and abilities of the individual to think and behave differently from before. The learning experience creates and changes her knowledge through the adaptation and continuous transformation of that experience, and therefore, it occupies a central role in her learning process [1]. Her learning would be an active and self-directed process, and would be the result of her interactions between the objective and subjective perceptions of her experience. It would be an opportunity to become more aware and productive than before, and therefore, she became invaluable to herself, her community, and her organisation.

Her learning process may be a deliberate activity such as a training programme where she would be a participant. It may also be an experience such as her recapitulation and reflection of an event where she may have been either an observer or participant. Her cognition and emotions would facilitate her learning through stages of her experience, viz., *concrete experience*, *abstract conceptualization*, *reflective observation*, and *active experimentation* in sequence beginning with her exposure to an event that would lead to her understanding [1]. Students played croquet to understand its material factors, patterns of human behaviour, individual differences, and game structure on the basis of Kolb's experience states [2]. First, the *concrete experience* of

the game shaped their *abstract* and *reflective experience*; later, they built models based on their gaming experience (*active experimentation*); finally, they extended and applied their theoretical perspectives to understand the practices in international relations, conceptually.

Learners' motivation may be affected by progress expectancy (that learning efforts would result in learning progress) and valence (that learning outcomes would be valuable) [3]. They found that conscientious individuals (i.e. committed, disciplined, and hardworking) would have a stronger motivation to learn because they would perceive that their efforts lead to performance that was both useful and valued.

Experiences, both good and bad, lead to powerful learning for the individual. Trainee soldiers performed far better when they became more aware of their failures and successes, every day [4]. Failures were remembered more than successes, and provoked enquiry, new thinking and awareness, while successes did not do so. Individuals were keen to explore more reasons for their failures than for success. Therefore, they found it easier to discuss faults and mistakes after failures than after a success. Those whose behaviour changed after an experience were more likely to be aware of and be able to explain the reasons for the events, whether failure or success. They were also more likely to accept responsibility for their actions, and were more confident to accept difficult tasks.

1.1 Simulations and Games

A simulation was an interactive teaching method and a powerful learning environment that produced critical thinking skills and encouraged the discovery and construction of knowledge [5]. It may be a structured game where the participants' attention is engaged in attempts to win. Educational objectives, specific roles, background information, rules of procedure, and a debriefing for discussion, reflection, and drawing conclusions were the major design elements of any simulation. A simulation depicts the behaviour of problems or issues within a system, entity, phenomenon, or process for study. A simulation could be any one or a mix of a role play, a game played with cards and other icons, on a board or in the open (field), or on a computer [6]. The typical game had interactions such as cooperation, competition, collusion, or conflict. The simulation could be likened to a caricature that simplified and reduced a larger system to a manageable smaller size, and then, used the game rules to manipulate and represent it to convey features, goals, constraints and other elements of the game [7].

The game could be perceived as an interactive environment of rules, competition, challenge, complexity, and constraints, and showed that students learnt when there was no peer pressure under competition, and concluded that competitiveness did not induce learning [8]. Students without pressure due to competition asked questions, read instructions, and exhibited more curiosity, while students under pressure due to competition limited themselves to surface learning. They surmised that competitions distracted the students from learning objectives.

A game architecture has three interconnected elements, viz., actors, rules, and resources, which create explicit and tacit contexts and problems [9]. The actors engage in analysis, planning, and making decisions. The rules guide the actors by setting the boundaries of play, including procedures for action and performance measurement. The

signs and symbols are the resources that facilitate the actors' actions and help them track their progress in the game. Together, these elements build the players' experience through awareness, articulation, and activity. From studies of other game researchers, Games were multifaceted, interdisciplinary, and non-disciplinary activities that engaged the players in solving problems [10]. Therefore, learning from games was best understood when analysed from different perspectives of humanities, social sciences, and design studies.

Both soft and hard skills could be learnt in business simulation games [11]. Team building, communication, inter-personal skills, negotiation, creativity, and collaboration were deemed soft skills, while hard skills included product knowledge, sales, decision-making skills, innovation and others relevant to managing business. A business was a complex interactive system of owners, managers and other employees, suppliers, customers, and government interacting under a variety of organisational and industry norms and other practices. Its external environment was under pressure from its competitors, technology effects, social conventions, regulations, national economics, and political changes. A business simulation game offered a learning experience to assist its players to understand such complex systems [12]. It was effective because the game play simplified the context, roles, and interactions for the players to reduce and bring ideas together (chunking), sequenced them, and coordinated the tasks in the game.

1.2 Objective of This Study

The business simulation game was an experiential learning exercise whose participants could learn business practices because of its interactive, exploratory, and interdisciplinary environment. The objective of this research was to analyse the nature of learning produced and felt by the participants from their experiences in a business simulation game. The learning from a business simulation game would augment and enhance the knowledge and understanding of game designers and users for the production of effective business simulation games and the use of such games, appropriately.

2 Method

2.1 The Game Players

The students were participating in the induction program of their two-year post-graduate course at the management school, New Delhi, India. This program was a four-day platform for their studies to follow, and the one-day simulation game was expected to form the foundation offering experiential exposure to and understanding of business and management issues. The students had graduate degrees in disciplines such as commerce, business administration, humanities, economics, engineering, science, and psychology. Most students were about 22 years of age and had no career experience. About 25% of the students were females.

2.2 The Business Simulation Game

The participants played *IceBreaker*, a competitive role-play enterprise business simulation game developed and conducted by the first author in 2003. Every student

received a 30-page manual with instructions, descriptions of key terms, and explanations of key processes in the game, and used a pen, paper, and an electronic calculator. The game was played across one day and represented two stages of business activity. Before the game began, they were allocated to teams of 4–5 members each, with each team having a similar proportion of males and females. During the game, they received other game documents describing business situations and seeking their decisions. The team results were in the form of financial statements, and each team received reports unique to its decisions. The roles for each team member were explained by the first author as the game facilitator, who also guided them about business and management issues and how to take decisions.

To facilitate their learning, the students interacted enthusiastically with each other in the team, engaged in debate, asked questions, read manuals and other game documents, and studied a variety of business data. Towards the end of the game, each team appraised its members' actions, decisions and business results, and described the nature and process of its learning in a quick vocal presentation. This was a critical debriefing process that enabled the participants to recall, reflect, consolidate and convert their play experiences into learning in the form of awareness of issues and decision rules [13].

2.3 The Instrument

A list of words and expressions that described learning and related action verbs such as *understand, awareness, do, act, conclude, perception, discover, analyse, measure, compute, integrate, mix, use, and found* was made. It was enlarged with business and management vocabulary like *selling, product, conflict, goal, data, competition, resource, and cash*. These words were then used to produce 28 statements. Then, long sentences were shortened, and difficult and confusing words were substituted with shorter and simpler words. Sentences with similar meaning were recast or avoided. The list was then scrutinised by three subject experts, whose suggestions for two changes were accepted and incorporated in the list. 'I learned how to influence sales', 'I recognised the presence of competition in the markets', and 'I discovered the purpose and use of cash in business' were some of the statements used in the instrument. The final instrument for learning had only 20 statements as it was administered along with another instrument of identical length for a study on *team cohesion* [14]. As was stated in that study, a longer instrument was avoided as it 'may not have received fair responses from the participants at the end of a rigorous game'. It was administered after the team's presentations at the end of the game.

3 Results

Complete and correctly filled copies of the instrument were received from 356 participants, although 369 copies were distributed and received from them. In the analysis of corrected item-total correlation data, item #1 showed a low value of .16, and was therefore, dropped from any further use in this study. The remaining 19 items were then subjected to exploratory factor analysis under principal component analysis with varimax rotation using SPSS 21.0. Table 1 shows the five factors and their respective

Table 1. Learning from a business simulation game: statements, factors and loadings

Statements and factors (N = 356)	Business goal orientation	Collaborative Action	Competitiveness	Business Skills	Sales function
<i>Business goal orientation</i>					
19. I was able to contribute, effectively, to the overall objective of the team	.74				
8. I became aware of the relationship between prices, customers, and sales	.62				
14. I was able to measure and direct organisational resources for achieving our goals	.60				
2. I learned how to influence sales	.53				
20. I now have a better appreciation of the business goals of an organisation	.53				
<i>Collaborative action</i>					
17. I concluded that the best decisions came from discussions and common consent		.75			
10. I found ways to resolve conflict with other members in the team		.64			
3. I found that working with others is more effective than working alone		.63			
11. We changed our thinking in tune with new information and events		.43			
18. I learnt from announcements, manual guidelines, and business data to take decisions		.39			
<i>Competitiveness</i>					
4. I recognized the presence of competition in the markets			.62		
13. I acquired a better view of the business of the organisation.			.60		
12. I now understand that purchase behaviour is a response to marketing efforts			.47		
9. It is important to link together organisational resources, decisions, and business goals			.38		
<i>Business skills</i>					
16. I discovered the purpose and use of cash in business				.67	
7. I acquired confidence in the speedy application of basic arithmetic skills				.65	
6. It will help me understand business events as reported in newspapers, TV and other media				.54	
15. I could see that data must be measured, understood and interpreted before use				.49	
<i>Sales function</i>					
5. I understood how sales was influenced by product features					.79
Eigenvalues	4.48	1.38	1.30	1.15	1.03
Per cent of variance explained	12.78	11.12	9.39	8.86	7.00

Extraction Method: Principal Component Analysis. a. Rotation converged in 20 iterations. Rotation Method: Varimax with Kaiser Normalization.

statements and loadings. Each factor had an eigenvalue exceeding one, and cumulatively, the extraction explained 49% percent of the variance.

The rotation converged in nine iterations. At a significance of .000, the Kaiser-Meyer-Olkin measure of sampling adequacy of .85 was above the recommended value of .6, confirming the adequacy of the sample size and the correlations between the statements as variables. Bartlett’s test of sphericity was highly significant ($\chi^2(171) = 1132.60, p < .001$). The high value of Cronbach α of .81 confirmed the reliability of the instrument.

The factor names represented the words and expressions in their respective statements and their respective loadings. In decreasing order of their eigenvalues, these factors were named *business goal orientation*, *collaborative action*, *competitiveness*, *business skills*, and *sales function*.

The factors were positively correlated with each other (Table 2). Four factors, *business goal orientation*, *collaborative action*, *competitiveness*, and *business skills* were highly and significantly correlated to each other ($r = .39$ to $.48, p < .01$). However, the correlation of *sales function* with the other four factors was not as strong ($r = .13$ to $.25, p < .01$ and $p < .05$).

Table 2. Learning from a business simulation game: Interfactor correlations

	M	SD	Business Goal Orientation	Collaborative Action	Competitiveness	Business Skills	Sales Function
Business Goal Orientation	20.31	2.33	.68				
Collaborative Action	20.98	2.30	.43**	.63			
Competitiveness	16.81	1.76	.48**	.39**	.54		
Business Skills	16.52	1.87	.43**	.40**	.41**	.55	
Sales Function	3.67	0.86	.15**	.17**	.25**	.13*	

** . Correlation is significant at the 0.01 level (2-tailed). * . Correlation is significant at the 0.05 level (2-tailed). Figures on the upper diagonal represent internal consistency of the factor in the first column

All regression results were positively predictive with moderate significance (Table 3). The analysis showed that *business goal orientation*, *collaborative action*, and *business skills* predicted three other factors each, *competitiveness* predicted all the other four factors, and *sales function* predicted only *competitiveness* (.08**). The *sales function* factor was predicted only by one factor, *competitiveness*, with the highest effect (.48***), while all other factors were predicted by three factors each.

Table 3. Learning from a business simulation game: interfactor regressions

Dependent Variable / factor	Constant / slope	Business goal orientation	Collaborative action	Competitiveness	Business skills	Sales function
Business goal orientation	0.89		0.29***	0.31***	0.21***	
Collaborative action	1.53	0.25***		0.18**	0.21***	
Competitiveness	1.31	0.29***	0.15**		0.19***	.08**
Business skills	1.34	0.23***	0.22***	0.23***		
Sales function	1.64			0.48***		

** . Correlation is significant at the 0.01 level (2-tailed). *** . Correlation is significant at the 0.001 level (2-tailed).

An analysis of the dyads of factors affecting each other identified the stronger factor in every dyadic relationship. Out of the seven dyads, *competitiveness* predicted *sales function* (.48***) far stronger than *sales function* could predict *competitiveness* (.08**). Of the remainder, viz., *collaborative action-business goal orientation* (.29*** and .25***), *competitiveness-business goal orientation* (.31*** and .29***), *business skills-business goal orientation* (.21*** and .23***), *competitiveness-collaborative action* (.18** and .15**), *business skills-collaborative action* (.21*** and .22***), and *business skills-competitiveness* (.19*** and .23***), the gap between the effects of each dyad was small.

The *sales function* had the highest constant (1.64) suggesting its relatively higher pre-existence, as compared to the lowest constant for *business goal orientation* (.89). The students acquired more understanding from the function, without the influence of other factors, than from the other four learning factors in the game.

4 Discussion

The factor analysis showed *learning from a business simulation game* to be a composite of five factors. The first four factors had high correlation with each other, and predicted each other, significantly. *Competitiveness* was the most versatile factor with the capability to predict all other factors. These results compared with past research findings from the literature review of simulation games that game participants acquired knowledge and gained conceptual clarity through action-directed and problem-centered learning [15]. They developed their social, emotional, and collaborative skills, built collaborations and relationships with their colleagues, interacted with team members, and managed conflicts constructively. The nature of these factors and their relationships and affects are first examined below, and later, their contributions to the study are discussed.

4.1 Business Goal Orientation

Performance is an outcome variable because results due to work orientation need some time to happen. For example, the performance of 268 airline employees materialized only after 4–8 months after the training which laid the foundation for their orientation [16]. Therefore, goal orientation may not produce instant results which may be due to personality characteristics, work issues (process and leadership), and external situations like tools and technology.

The achievement goal orientation was determined by the nature and content of the goal and its proximity from its actors and their resources. The goal orientation of 524 trainees in their study affected their self-regulatory processes of monitoring (thoughts and behaviours), evaluation (comparison to performance standards), and reactions (emotions and cognitive attention) [17]. The nature of the goal was determined in terms of its frame of intensity, difficulty, and specificity. The goal content had learning (competence and task mastery) orientations and performance orientations (with respect to others' ability). Goal proximity could produce challenge, anxiety, frustration and

failure because the distance of the goal from the actions would enlarge the difficulty to achieve the goal.

The goal was the purpose or reason that drove achievement-related behaviour. Motivation was an action-based process that affected the self and created motivational systems [18]. Although performance driven goals and mastery were both affected by competence, performance driven goals may hurt the learning of students in their classrooms.

The nature of goal orientation could affect team behaviour to respond to changing goals. While a learning orientation pursued knowledge and challenges with persistence to understand and overcome the problem, individuals in a performance orientation sought to outperform others in a competitive situation, but with little attention to or focus on learning [19]. Alone, performance orientation took time to produce any performance, while too much learning orientation may lose sight of performance, and produce little or none of it. Individuals with high levels of both learning orientation and performance orientation may be too confused in action, and produce no results.

According to the goal setting theory, a clearly understood and challenging goal may attract more attention and produce better performance than one that is vague, abstract, and easy to achieve [20]. The individual's potential to accomplish a goal depends upon her ability, situational resources, commitment to its achievement, and receipt of valid, adequate and timely feedback to motivate her and help her learn and change in her journey to the goal.

Achievement goal theory or goal orientation explains an individual's motivation, her response to challenge, her resilience, and the depth of her engagement with work. It links her emotions, thoughts, behaviour, and experience to produce goals and outcomes such as to acquire competence, to outperform others, to learn and to act, but in ways and conditions that have been difficult to recognise, measure or understand [21].

4.2 Collaborative Action

Individuals come together to share interests, concerns, problems, and knowledge with each other. Collaborative action within amorphous and fluid groups in an organisations tends to focus on sharing information, not solving problems or on interdependent tasks, and operate under facilitative, not directive, leadership environments [22]. Thus, members of such communities of practice interact with each other and evolve to become formal teams with clear goals, purposeful leaders, visible cultural practices, and regulated processes. Driven by and shaped by these collaborative actions, they become more aware, productive, and useful to others and themselves. However, their satisfaction would depend on their empowerment and the extent of the concern of leadership for teamwork and cooperation in the groups.

Collaboration created opportunities because it was about working together [23]. He explained how teachers could share pedagogy, practices, and experiences to understand the meaning of their work, to conduct experiments, and to deliver and complete a variety of educational projects. An outline of the collaborative theory identified two strands of collaborative behaviour from the shared experiences of 100 graduate students in a study [24]. The *Individual First* behaviours were represented by the interactions of a team member with and influence over her colleagues, viz., *turn-taking*,

observing and doing, and *status seeking*. The *Team First* behaviours were represented by the team's interactions with its members, viz., *group cohesion*, *influencing others*, and *organizing work*, and appeared to be managerial and leadership oriented. Thus, collaboration was a blend of shared aspirations, objectives, roles, and actions of the individual and her interacting partners.

Learning how to collaborate is rooted in actions such as discussions, getting consent, and resolving conflict through interactions with others. Two types of in-game collaborations could be attributed to the scripted and emergent roles of the players [25]. The *complementarity* type was seen in the actions of its players, while in the *information sharing* type, data was collected and processed to develop clarity between the players. Solving problems jointly was the most visible collaboration activity.

4.3 Competitiveness

A hypercompetitive individual may use unethical practices, may be dogmatic, unsympathetic and uncooperative, and may show Machiavellianism traits of ruthlessness, impatience and irritability [26]. Alternatively, in the personal development model of competitiveness, the individual is keen to improve herself, enjoy and seek mastery of her actions, processes and tasks, to help others, and to behave ethically. Thus, competitive individuals may differ in terms of their ethical and altruistic behaviours.

Four factors of competitiveness were extracted and explained from 11 subscales of competitiveness and a confirmatory factor analysis of 37 items [27]. *General competitiveness* represented the person's assessment of her enjoyment of competitiveness and belief in herself as a competitive individual, including a desire to win in her chosen contexts. *Pervasive competitiveness* represented her competitive desire to outperform and excel over others. *Dominant competitiveness* was her need to be the best with respect to others and show superiority over them. *Personal enhancement competitiveness* was her intention to compete to become more competent or achieve more than before.

Competitive players in team sports acquired and developed skills to execute key moves and to overcome the actions of their opponents [28]. Although competitive, they interacted and coordinated, adaptively and cooperatively, with their co-players to win. Perceiving competitiveness to be as a personality trait, a behaviour, and a dynamic state, the researchers proposed that the competitive process encouraged and produced creativity, innovation, learning, and performance.

Although men and women had similar capabilities, women were likely to avoid competitive situations such as negotiation, unlike men. Eight studies showed that women preferred smaller competitions, irrespective of domains, as compared to men, due to contextual factors dictated by socially acceptable gender norms [29]. Thus, women may frequent smaller rather than larger social groups due to their perceived level of comfort.

A study of 339 under-graduate students pursuing entry into medical courses found that their enjoyment of competition correlated positively with their physical health and self-efficacy [30]. Their competitiveness was studied as a trait, not as a learned behaviour, and it indicated their desire to succeed in interpersonal conditions. The researchers concluded that good physical health produced not only good grades and satisfactory learning outcomes, but also enjoyable competitive and learning environments.

4.4 Business Skills

The entrepreneur's communicated vision, self-efficacy, and goals directly affected the growth of her firm. Conversely, her passion for work, tenacity, and new resource skills affected such growth, indirectly [31]. Thus, her effective business skill was not any single attribute, but would be a composite of her traits, skills, and motivations. Her strategic foresight, her conviction to get things done and accomplish tasks, and her fierce commitment to her goals would enable her to succeed in and grow her business firm. As a factor of production, skills played a key role in the management of the firm and helped it to grow. A skill was 'the ability to execute specified tasks' and stated that skills were classified on the basis of such tasks [32].

A study of 287 under-graduates of textile and apparel courses found that their intercultural, networking, and financial skills predicted their entrepreneurial knowledge and skills [33]. These business skills comprised the course and helped them acquire the entrepreneurial confidence necessary to start and manage a small business and to develop a global perspective. A skill was an evolution and the product of repeated practice that ended in superior performance. The skills of the FIDE chess players were acquired over years of play, and were recognised in terms of their competition results and against the relative strengths of their opponents [34]. Using the basis of the power law of practice (an example of the learning curve on performance), each player developed such cognitive skills at her own pace.

An extensive review of literature showed that skill variety comprising of knowledge and skills predicted and produced entrepreneurship [35]. Typically, along with industry-specific knowledge such as languages, mathematics, and technical, the skills were comprised of management and business skills such as decision making, research, analytical, negotiation, production, financial and marketing skills. Often, this skill variety was due to work-related task experience in a business environment, and may be found in individuals with low appetite for risk, an inclination to create and innovate, and an eagerness to absorb new experiences.

4.5 Sales Function

A competency was a behavioural characteristic of the individual that enabled her to achieve her goal. A content analysis and interviews of marketing managers in South Africa showed that marketing competency included oral and written communication, interpersonal and persuasion skill, service marketing ability, technological and computing skill, and global perspectives [36].

A study of 461 sales representatives showed that they spent their time on customer acquisition (searching for and finding leads), customer retention (relationship management and cross-selling), and other activities (accounting, training, etc.) [37]. Their efforts were focused on the customer who, in the ultimate analysis, was the key to the firm's success in terms of revenues, sustenance, and survival.

4.6 Conclusions, Implications for Further Research, and Recommendations for Action

This study produced five factors of learning from a business simulation game, viz., *business goal orientation*, *collaborative action*, *competitiveness*, *business skills*, and *sales function*. The game participants became aware of the business goals of their firms, and learnt to hone their analytical skills and to make resource, business and marketing decisions with focus on their goals. They learnt to collaborate with their team members and to perceive the presence of competition from the other teams. Thus, they acquired multiple views of the business of the firm from their learning experience in the game. The game was found suitable for teaching and learning activities in a business management course, countering other findings and apprehensions of suitability barriers [6].

Individuals with Machiavellian tendencies may endanger the organisation and its stakeholders, and the members of the teams they belong to. The study of the relationship of Machiavellian behaviour with the other learning factors, viz., *business goal orientation*, *collaborative action*, and *business skills* may generate new and useful knowledge. Such findings may have serious implications for a manager's recruitment and placement in the organisation [26].

Does a player's creativity and innovation affect her learning from simulations and games? Does playing in simulations and games enhance her creativity and innovation [28]? As creativity, innovation, simulations and games are critical thinking exercises, we need research to find the answers to these questions because they may offer profound insights in learning and development behaviours.

Collaborations use informational, social and personal resources of team members who invest in their colleagues to produce value, jointly. Although the time spent in collaborative work had increased during the last two decades, value from collaborations had emerged from barely 3–5% of the participants [38]. The value in collaborative action is vastly unexploited. Organisations must restructure roles, work and processes, appropriately, to produce more efficient teamwork and collaborations from interactive arrangements.

Game designers must create multi-faceted learning experiences that have elements such as business objectives, resources, and products for sale in their business simulation [9, 10]. Their participants must interact frequently with others to produce knowledge from data analysis, make decisions, and collaborate with others in a team under changing environmental and competitive conditions.

Individuals with *general competitiveness*, *pervasive competitiveness* and *dominant competitiveness* traits are suitable for competitive business roles such as business development and sales [27]. Those with *personal enhancement competitiveness* may be better suited for exploratory roles such as business research development and customer interaction roles. Business simulation games could be used to measure and identify their players in terms of the competitive traits, and then, fit them to roles, appropriately.

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