

Business Games and Simulations: Which Factors Play Key Roles in Learning

Andrea Ceschi^{1,2}, Riccardo Sartori^{1,2}, Giuseppe Tacconi^{1,2}, and Dorina Hysenbelli³

¹ Department of Philosophy, Education and Psychology, University of Verona,
Lungadige Porta Vittoria 17, 37129 Verona, Italy
{andrea.ceschi,riccardo.sartori,giuseppe.tacconi}@univr.it

² CARVET, Center for Action Research in Vocational Education and Training,
Lungadige Porta Vittoria 17, 37129 Verona, Italy

³ Department of Developmental Psychology and Socialization, University of Padova,
Via Venezia 8, 35131 Padova, Italy
dorina.hysenbelli@unipd.it

Abstract. The paper reports the results of an empirical study on the effects and impact of a specific business game, which is also a team competition, treated as an innovative teaching tool in learning. The paper starts by introducing business games and simulations as methods able to improve learning experiences and goes on by dealing with the specific business game simulation used for the aims of our research. Considering the most relevant empirical studies on business games and simulations, the following four factors were extracted in order to test their importance for learning: Decision-Making Experience (DME), Teamwork (T), Simulation Experience Satisfaction (SES), Learning Aims (LA). Each construct has been investigated by using a questionnaire administrated to 48 participants of the Stock Market Learning Simulation divided into 10 teams. Results show the importance of these factors in detecting critics aspectal of learning using a business game simulation.

Keywords: Business games and simulations, learning.

1 Business Games and Simulations: A Review

Business games are role-playing experiences which address economic and financial issues and aim to develop monetary and financial management skills in participants. Students, trainers and workers taking part in this kind of activities approach managerial issues and take decisions based on market strategies. The main educational aim of business games is to develop decision-making skills and confidence with business strategies [10].

Simulations are evolving open-ended situations of particular social or physical realities in which participants take on bona fide roles with well-defined responsibilities and constraints [2]. They reproduce reality in order to create a better training environment.

Business games and simulations are direct forms of experiential exercises. “Experimental learning” is a dialectical process where all concepts are continually subject to revision and changes through lived experience are possible. Kolb (1984) states that, in addition to simple cognitive processes, the learning experience has an interactive nature, which constrains different levels of learning [12]. The author underlines that “students immersed in doing” develop abilities that are already inside them. The main aspect of the learning process is based on the “concrete experience”, thanks to which the person is totally involved. Accordingly, this allows to do new experiences and to develop the knowledge necessary to give birth to new styles of thinking and doing. This part of learning is considered helpful to illustrate the process of learning, overall in the management of problem solving and decision-making [13].

Business games and simulations provide advantages not found in exercises using discrete, static problems. First, they bridge the gap between the classroom and the real world by providing experience with complex, evolving problems. Second, they can reveal student misconceptions and understandings about the content. Third, and particularly important, they can provide information about students’ problem-solving strategies [6].

Considering these characteristics, how widespread are simulations and business games? And in what way do institutions use them to improve learning?

A study shows that, in USA, business games are used by 62% of companies for their training programs. Moreover, 97.5% of AACSB International Business Schools and 66% of teachers in schools use simulations to teach business strategies. Participants can do business activities, take decisions on different areas, and increase abilities [3]. Mintzberg (1987) finds that, during a business game, participants are encouraged to develop and use strategies rather than simply apply knowledge and concepts. If participants are busy in the performance for a period of time which is long enough, they can receive benefits for the evaluation of their own strategy [14]. Education through virtual games allows participants to replicate their behavior in reality. Effectiveness of simulations depends on educational roles and learning in a symbolic form [12].

Compared to classical educational techniques, simulations allow variability in the activities. Participants learn through active learning and through personal styles. Groups of participants playing the simulation and applying their strategies to work can create a group style of working where everyone is involved. In this way, a group becomes a team, where a team is conceived as a group of agents adopting the appropriate joint and individual mental attitudes [17]. Finally, business games and simulations stimulate intellectual skills and emotive aspects, since they encourage curiosity, competition in front of challenges and pleasure/displeasure when anyone wins or loses.

1.1 Important Factors in Business Games and Simulations

One of the most important aspects of games and simulations is that decisions must be made in team. For example, participants in business games must organize a plan, accomplish it, and carry out an elaborated project. All together. This can be a really

demanding and challenging task for people taking part in the game, because they may have just theoretical knowledge and never been involved in such kind of experiences. The polarization between theoretical concepts and practical skills can emerge during the training and be the occasion for participants to reflect on it or even to discuss and argue. In any case, games and simulations may help to fill the gap.

Participants in games and simulations may learn to apply theoretical concepts to reality by means of behaviors elicited in a protected context. "Micro-World" is the expression used by Kofman and Senge (1993) to describe the experience of managers involved in games and simulations, where participants can learn how to manage a business in a controlled environment. For business game's participants, identifying a problem (problem-finding), organizing data (problem-setting) and elaborating a strategy to solve it (problem-solving) can be difficult but also constructive processes [11]. Participants seem to develop their decision-making abilities by considering opponent roles and they consider opponent roles because this encourages their attention to be focused on the moves to do [8]. Given these premises, the so-called "decision-making experience" seems to play an important role in simulations and business games, and that's why we decided to consider it in our study.

Building a strategy based on behavioral styles means that every member feels they belong to a team. A team differs from a group in that it is in direct competition with other teams for resources. In order to be successful, participants must be able to draw data from the context, compete with other teams and plan actions based on self-criticism. This learning can happen easily through the participation in games and simulations. The concept of teamwork is often associated to cohesion. Härtel, Härtel, and Barney (1998) have defined teamwork as an essential characteristic of teams which, over time, have developed a history of shared attitudes and behavioral patterns or norms through experiences or events [7]. Working in team means to try to obtain results based on group climate [1, 15]. A positive and serene group climate is usually associated to better performance. On the contrary, if group climate is tense or people in the team are hostile, the performance is likely to be worse. Teamwork is an important construct that should be considered in testing the potential of a simulation that requires team cohesion, and that's why we decided to consider it in our study.

Satisfaction towards the game experience is another important factor able to influence learning. Games and simulations seem to increase the level of involvement and satisfaction in participants through different activities [5]. In teaching based on simulated realities, participants should feel that activities are not simply didactic tools aiming to test knowledge and abilities, but experiences simulating their professional contexts. It is also important to distinguish participants' satisfaction for a new activity from participants' satisfaction for the success of the team. As already said, simulations can result in different feelings [3]. Nevertheless satisfaction seems to be an important construct that should be considered in testing the potential of games and simulations, and that's why we decided to consider it in our study.

Finally, we can say that business games are virtual simulations that can be innovative educational tools involving participants and letting them both feel satisfied and develop new abilities and knowledge. In order to analyze the learning potentials of

business games, it is important to test participants' perception of whether the game has reached the learning aims or not. This is also an important factor to be considered in testing the effectiveness of games and simulations, and that's why we decided to consider it in our study.

1.2 The Stock Market Learning Simulation

In order to study the importance for learning of the factors presented above, we have considered the project Stock Market Learning Simulation (SMLS), which is an initiative promoted by different European savings banks and European banking foundations. This simulation constituted an opportunity for people in training to invest a virtual starting capital of 20000 euros on the stock market. Teams had 10 weeks to increase the value of their deposit. The trading was based on share prices and real stock exchanges on the major financial markets.

Each trainee was put in a team with a supervisor and took part in making decisions. The trainees received some information (feedback) about their portfolio in the mid-term and at the end of the competition. In order to involve participants, they had to operate frequently. Otherwise, they were disqualified. It is important to know that they had some advice in order to develop investment, so not only the total value of their account was important, but also their ability to earn from investments suggested by trainers. Focusing on sustainability, the simulation aims to promote prudence and far-sightedness among people, by developing long-term strategies to short-term profit-making without losing sight of economic aims.

2 Aim and Method

2.1 Participants

Participants were 48 Italian students from Economic studies who took part in the business SMLS (age 18-22, 62% females). They were divided into 10 teams.

2.2 Material and Procedure

Since task performance times were equal for every team (the simulation lasted 10 weeks) and all the teams at the end of the competition doubled their initial amount of 20000 euros, a questionnaire was developed and administered to participants in order to test the constructs described in the theoretical part: Decision-Making Experience (DME), Teamwork (T), Simulation Experience Satisfaction (SES), Learning Aims (LA). Each construct is measured by four items developed by considering questions used in studies aiming to analyze prominent factors for learning in business games and simulations [3, 4, 5]. Answers were given by using a five-point rating scale, where 1 expressed the minimum appreciation, while 5 expressed the maximum.

3 Results

Table 1 reports the descriptive statistics of the total deposit gained by the 10 teams at the end of the competition, in order to show that, after 10 weeks, all the teams doubled their initial virtual amount of 20000 euros, which means that teams achieved good learning and performance.

Table 1. Descriptive statistics of the total deposit gained by teams at the end of the competition

	Numbers of teams	Minimum	Maximum	Mean	Standard Deviation
Total deposit	n = 10	40581	51526	44843	3097

So, since it was not possible to use performance or time to assess the effectiveness of the business game for learning, for every participant a total score for each construct measured by questionnaire was computed, as well as the total mean scores and the Cronbach Alpha reliability for each construct.

DME's mean score is 4.01 (SD = 1.30). The mean score of T is equal to 3.34 (SD = 1.56). SES presents a mean score of 3.94 (SD = 1.28). LA presents a mean score equal to 3.82 (SD = 1.28).

The reliability of the constructs analyzed are acceptable, varying from 0.62 to 0.82.

4 Discussion

The construct presenting the highest mean score is DME ($M = 4.01$, $SD = 1.30$), probably because participants had the possibility to make several important and strategic decisions during the business game. This probably allowed them to acquire a personal significant decision-making experience and to develop problem-solving skills. Each team developed its strategy and, consequently, testing DME is important to have a team index of the decision-making experience. It is clear that DME is in part related to T ($M = 3.34$, $SD = 1.56$), because participants worked in teams and developed financial tactics together. Theoretical argumentation previously presented also sustains that T facilitates game strategies [10, 16].

A related issue concerns critical factors of team climate and their effects on team performance. One useful framework for the study of teamwork through team climate is constituted by the four factors that West and Farr (1990) identified as being central in determining effective team functioning: vision, participative safety, support for innovation and task orientation [18]. According to West and Farr model, participation in the decision processes of groups increases the likelihood that members produce more outcomes of decision and, therefore, that they offer new ideas. Efficient participation must be supported by safe interpersonal conditions (participative safety), while innovating performance also requires the commitment of groups to achieve the highest possible standard of task performance (task orientation) and to offer articulated and enacted support (support for innovation) for attempts at innovation ideas [9].

Also SES reaches a good score ($M = 3.94$, $SD = 1.28$). Participants reported that the business simulation game was a good experience in terms of satisfaction and they justified this by asserting that simulation is a good learning system for such aspects as interactivity and innovation. We can hypothesize that, through simulation, participants strengthen their theoretical concepts and applied business strategies based on the theories they have studied at school. In fact, several empirical studies suggest that business games improve learning [3, 6].

Finally, the mean score obtained by LA ($M = 3.82$, $SD = 1.28$) seems to demonstrate that participants were able to recognize the aims of the simulation and appreciate the results of the activities in terms of personal learning.

5 Conclusion

Evidence obtained from our study allows us to advance some conclusions about games and simulations as teaching tools.

Games and simulations have the possibility to represent, for participants, positive and stimulating experiences. They also seem to improve team cohesion and group spirit. Every education and training activity could benefit from games and simulations. As in real life, even in business games there could be failures resulting from wrong choices, but just wrong choices and their direct consequences can help people to better understand errors and mistakes and develop solutions.

As a matter of fact, such business games as the Stock Market Learning Simulation have both advantages and disadvantages, but, also considering the results of the questionnaire administered, they can be considered as innovative systems that involve participants in experience strategies and decision-making skills.

References

1. Anderson, N.R., West, M.A.: Measuring climate for work group innovation: development and validation of the team climate inventory. *Journal of Organizational Behavior* 19(3), 235–258 (1998)
2. De Freitas, S., Oliver, M.: How can exploratory learning with games and simulations within the curriculum be most effectively evaluated? *Computers & Education* 46(3), 249–264 (2006)
3. Faria, A.J.: Business simulation games: current usage levels—an update. *Simulation & Gaming* 29(3), 295–308 (1998)
4. Faria, A.J.: The changing nature of business simulation/gaming research: A brief history. *Simulation & Gaming* 32(1), 97–110 (2001)
5. Faria, A.J., Wellington, W.J.: A survey of simulation game users, former-users, and never-users. *Simulation & Gaming* 35(2), 178–207 (2004)
6. Gredler, M.E.: Games and simulations and their relationships to learning. *Handbook of Research on Educational Communications and Technology* 2, 571–581 (2004)

7. Härtel, C., Härtel, G., Barney, M.: SHAPE: Improving decision-making by aligning organizational characteristics with decision-making requirements and training employees in a metacognitive framework for decision-making and problem-solving. *The International Journal of Training Research* 4, 79–101 (1998)
8. Hirokawa, R.Y., Poole, M.S.: *Communication and group decision making*, vol. 77. SAGE Publications, Incorporated (1996)
9. Kivimäki, M., Kuk, G., Elovainio, M., Thomson, L., Kalliomäki-Levanto, T., Heikkilä, A.: The team climate inventory (TCI)—four or five factors? Testing the structure of TCI in samples of low and high complexity jobs. *Journal of Occupational and Organizational Psychology* 70, 375–389 (1997)
10. Knotts, U.S., Keys, J.B.: Teaching strategic management with a business game. *Simulation & Gaming* 28(4), 377–394 (1997)
11. Kofman, F., Senge, P.M.: Communities of commitment: The heart of learning organizations. *Organizational Dynamics* 22(2), 5–23 (1993)
12. Kolb, D.A.: *Experiential learning: Experience as the source of learning and development*, vol. 1. Prentice-Hall, Englewood Cliffs (1984)
13. Kolb, D.A., Lewis, L.H.: Facilitating experiential learning: Observations and reflections. *New Directions for Adult and Continuing Education* (30), 99–107 (1986)
14. Mintzberg, H.: *Crafting strategy*. Harvard Business School Press (1987)
15. Nilniyom, P.: The impacts of group climate on creativity and team performance of auditors in Thailand. *International Journal of Business Research Publisher: International Academy of Business and Economics* 7(3) (2007)
16. Segev, E.: Strategy, strategy-making, and performance in a business game. *Strategic Management Journal* 8(6), 565–577 (1987)
17. Tidhar, G.: *Team-oriented programming: Social structures*. Technical Report 47, Australian Artificial Intelligence Institute, Melbourne, Australia (September 1993)
18. West, M.A., Farr, J.L.: *Innovation and creativity at work: Psychological and organizational strategies*. John Wiley & Sons, Chichester (1990)