

**Edu World 2016**  
**7th International Conference**

**GAMES AS STUDENT GROUNDWORK FOR  
BUSINESS MANAGEMENT TRAINING**

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**Abstract**

Digital games are employed with excellent results in teaching because they use to create strong connections between the student and the subject to be learned. On the side of the learner they benefit from interactivity, challenge, immersion and fair assessment of the results, while on the studied subject side they offer repeatability of the notions, fast adaptation to the domain changing, compliance with the student profile and risk free simulations for notions that require experimentation. The paper shows the importance of serious games in education with accent on the business area. It is presented a case study regarding the use in the academic curricula of the IBM INNOV8 serious games, developed by IBM as part of their Academic Initiative program. The study reports the results of master students playing the game and their opinion about its usefulness as training for business activities. There is investigated the perceived connection of the simulations to business process management aspects like process discovery and process modelling, problem recognition, problem solving, iterative process improvement, analytic and strategic thinking, decision making, real-time business management, proactive thinking, defining goals, team work and time management. The paper investigates the possible ties between the business process management encountered in games, the academic background of the students, as well as the profession and position in the company for the employed ones.

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**Keywords:** Computer games; serious games; business management; business simulation games.



## **1. Introduction**

### **1.1. Computer Games Nowadays**

While games represent activities providing entertainment since the start of the mankind history, computer games are fostered for just half of century. Their success is so dramatic that they are now part of the popular culture. The persons who are playing more video games are doing it not just in the detriment of watching TV or going to movies (Entertainment Software Association, 2015) but also of reading. The use of computers for leisure is generalized nowadays – US individuals ages 15 to 19 spend for playing at a computer an amount of time 6 times higher than for reading and for individuals ages 20 to 24 this ratio is 3.5 (Bureau of Labor Statistics, 2015).

### **1.2. Experiencing Games in Education**

In education, computer games shouldn't be perceived just like hazards that steal the time of the learner and endanger his concentration. Serious games, applications that target not just the entertainment, are successfully used in all levels of education (Vasilateanu, Wyrzic, & Pavaloiu, 2016), (Nichifor, Dascalu, & Neagu, 2016) mainly because they strengthen the connections between the student and the subject to be learned.

The Faculty of Engineering in Foreign Languages (FEFL) from the University POLITEHNICA of Bucharest (UPB) organizes tuition in one of the major languages - English, French or German. One of the successful Master programs from FEFL is the Business Administration and Engineering (MBAE) one, organized for 20 years and having several hundreds of graduates. The program is attended by students with different cultural and educational backgrounds (Pavaloiu, Neagu, Roșu & Dragoi, 2016a), pursuing management positions in the companies they are working for wanting to improve their digital skills. Gaming and simulation are good tools to overcome the difficulties raised by taking decisions in real life, allowing the students to exercise running a business without the fear of making real mistakes and can experience the outcomes of their actions, so this approach is intensely experienced in our group (Pavaloiu & all, 2015) (Vasilateanu & all, 2015).

Business Simulation Games (BSG) are excellent training tools, which allow the player to get experience in the management of economic processes before facing real situations. A business process is a set of activities designed to achieve a specific organizational goal, the ensemble of business processes acting like an inner engine for the organization (Trifan & Mustata 2015), (Mustață, Trifan & Hăntulie 2016). For a business, to manage processes means to determine how to create products and services and how you interact with the customers. Business Process Management (BPM) is dealing to the improvement of a company performance by optimizing its business processes. Simulations are used to help predict potential impacts of changes to current operational processes and compare business scenarios prior to implementation, providing a quantitative basis for decision making (Vuksic, Bach & Hernaus, 2014).

## **2. Games for Business Management Training**

### **2.1. IBM INNOV8 Games**

One of the important BSG examples is provided by IBM's INNOV8 (Morariu & de Coutere, 2010), (Bulander, 2010). We will present in this paper a case study regarding the use of the IBM INNOV8 games in the academic curricula as part of Business Management training. The group of students participating at the experiment come from the MBAE program developed at the FEFL. They form a heterogeneous group because of their academic and cultural backgrounds, demanding special attention for academic training. The instruction using simulation-based serious games mends the process of development for the management aptitudes and provides details and insights into the business that is under scrutiny, being an adequate groundwork for business management training.

The INNOV8 is a serious game which was developed by IBM as part of their Academic Initiative programme. They rely on IBM's Smarter Planet real-world examples: Smarter Traffic (where one has to synchronize the circulation in a city), Smarter Supply Chain (where one has to maximize the efficiency and the effectiveness of a supply chain using an environment friendly approach) and Smarter Customer Service (where one has to maximize the client satisfaction and income). The online version of the game is available at <http://www-01.ibm.com/software/solutions/soa/innov8/innov8game.jsp> (Fig. 1).

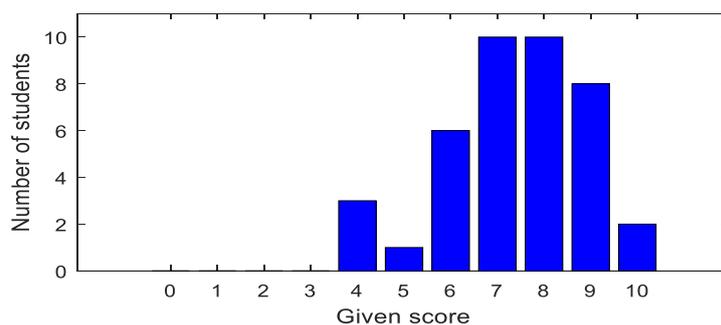


**Fig. 1.** INNOV8 start window

## 2.2. Case Study

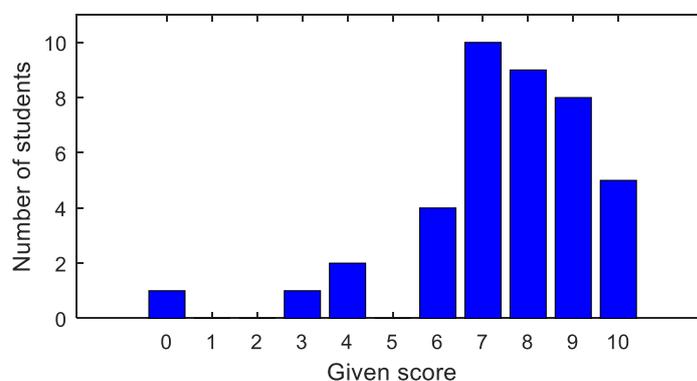
Pavaloiu, Neagu, Roșu & Dragoi (2016b) presented some of the results of the INNOV8 game played by the MBAE students from FILS in the last five years. In the period December 2015-January 2016, 41 students filled in a questionnaire about the INNOV8 games. We present here the results regarding the supposed connections between the games and their influence to BPM aspects like process discovery and process modelling, problem recognition, problem solving, iterative process improvement, analytic and strategic thinking, decision making, real-time business management, proactive thinking, defining goals, team work and time management. The students grade the influence of the INNOV8 games to these aspects with grades from 0 to 10. Grades from 7 to 10 are considered good and show a large influence, grades from 0 to 3 are considered low and grades from 4 to 6 show an average influence. One set of answers was eliminated because of biasing and in a few cases, answers are missing for some questions.

Considering the usefulness of the INNOV8 games for opportunity and problem recognition, 75% of the students give good grades (Fig. 2). Almost all the students are aware of the importance of these games in problem recognition because of the help and explanations received during the play.



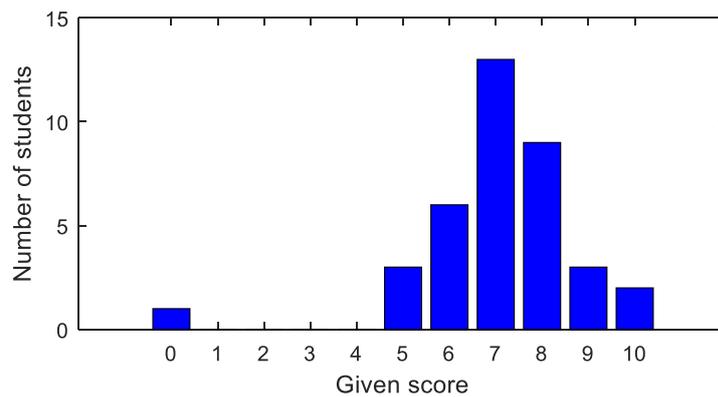
**Fig. 2.** Capacity of opportunity and problem recognition.

Taking into account the usefulness of the INNOV8 games for problem solving, 80% of the students give good grades (Fig. 3). The games are pretty difficult and some students which considered them as helpful for problem recognition are not considering them supportive enough for problem solving.



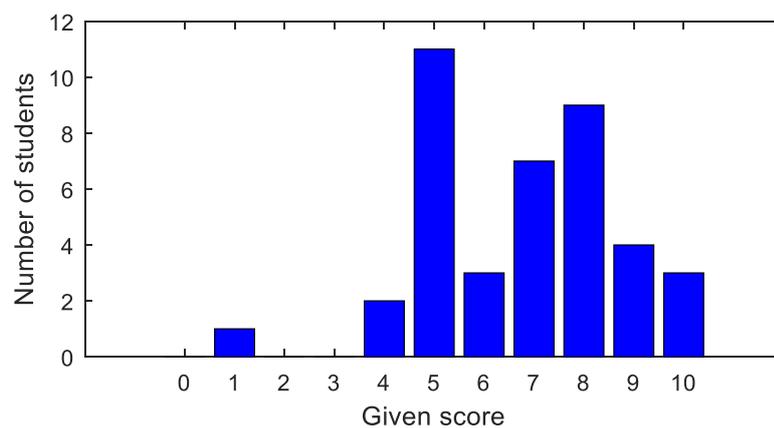
**Fig. 3.** Practice and improvement of problem solving

Bearing in mind the usefulness of the INOV8 games for iterative process improvement, 73% of the students give good grades (Fig. 4). The games can be played many times and the students were encouraged to obtain good results, without a precise definition of it. At the end of each game the player obtains a score and many of them tried to improve it. The grades of 8 to 10 are highly correlated with many repetitions of the game, while there are three students with poor scores that didn't answer to this question.



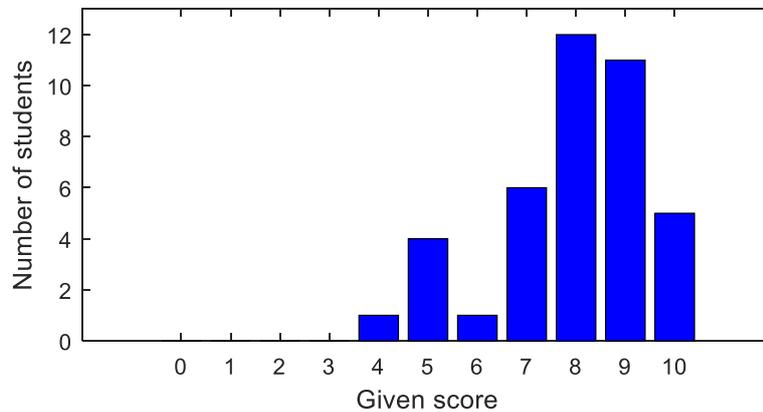
**Fig. 4.** Practice of iterative process improvement

Taking into consideration the usefulness of the INOV8 games for process discovery, just 58% of the students appreciate them highly (Fig. 5). The large number of students that accorded 5 points does not belong to the ones with computer science background and are probably not aware of the process discovery concept. In is extremely probable that they put an average grade to avoid a large mistake in the answer.



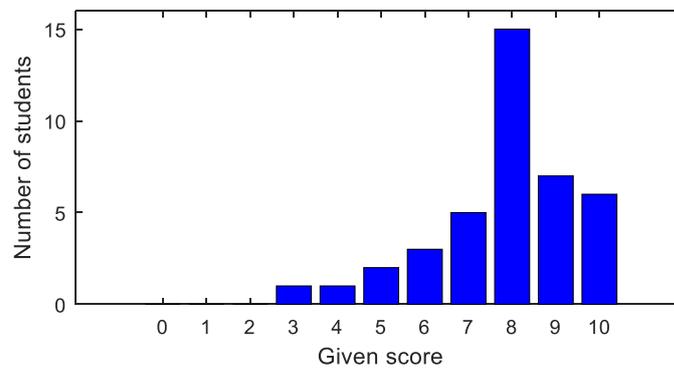
**Fig. 5.** Practice and improvement of process discovery

Considering the usefulness of the INOV8 games for analytic and strategic thinking, It can be seen that 85% of the students give good grades (Fig. 6). This aspect gained the higher scores from the ones being evaluated, showing excellent appreciation by the students which are employed.



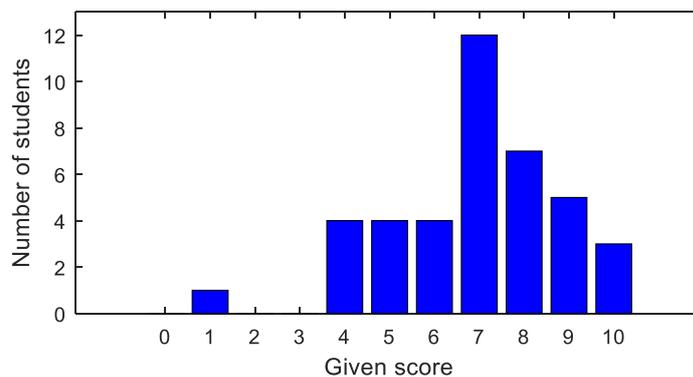
**Fig. 6.** Practice and improvement of analytic and strategic thinking.

In view of the usefulness of the INOV8 games for decision making, 83% of the students give good grades (Fig. 7). The results show a great concentration around grade 8, indicating that the students understood the concept and are coherent in appreciating it and 100% of the students that are employed gave good grades for this topic.



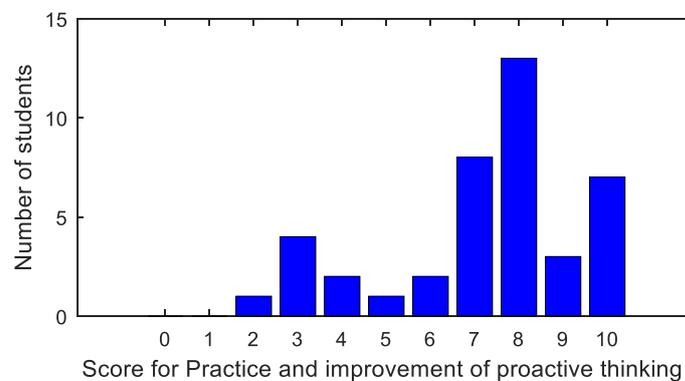
**Fig. 7.** Practice and improvement of decision making.

Taking into account the usefulness of the INOV8 games for real-time business management, 68% of the students give good grades (Fig. 8). There is a rather large number of students that are not confident with the utility of the games in this aspect and some stated later that they entered the game and played at their own pace – if there is no timer, they do not consider a game to deal with real-time situations. Some of the students shown interest in the discussions after the questionnaire to have a real-time part of the game, where decisions should be made on spot.



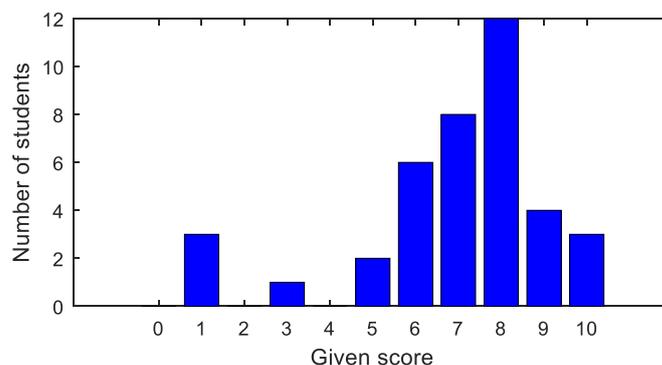
**Fig. 8.** Practice and improvement of real-time business management.

In view of the usefulness of the INOV8 games for proactive thinking, 80% of the students give good grades (Fig. 9). The distribution of the results is not a gaussian one, showing that probably some of the students have not understand the concept meaning.



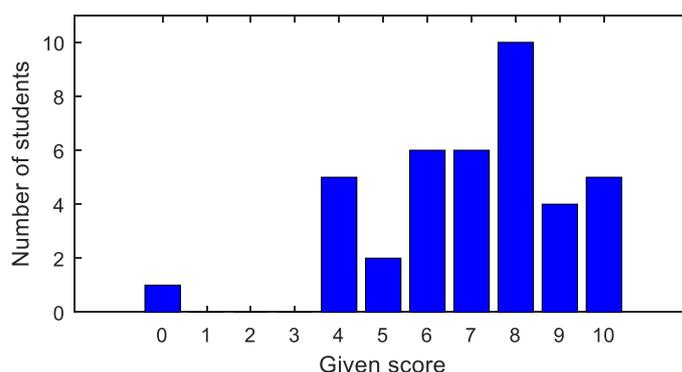
**Fig. 9.** Practice and improvement of proactive thinking.

Considering the usefulness of the INOV8 games for defining goals, 69% of the students give good grades (Fig. 10). Some of the students with very good academic results have given small scores at this topic, complaining that the scenarios have imposed some trajectories and they have not the freedom to choose and follow their own goals. Another complain come for the fact that the games targets have given loads and the weights are questionable because the goals asserted by the game designers may not be the desired ones – a student asked “why not to care more for the environment?”.



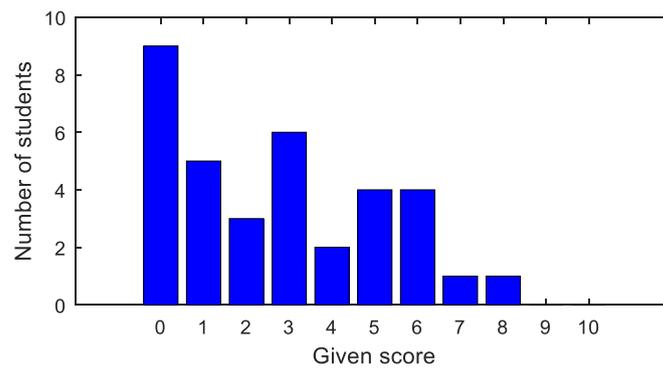
**Fig. 10.** Practice and improvement of defining goals

Taking into consideration the usefulness of the INOV8 games for time management, 64% of the students give good grades (Fig. 11). The students appreciate this topic, but there is no emphasis on the influence of the INNOV8 games on time management, the results being sparsely distributed on the good and average zones of influence.



**Fig. 11.** Practice and improvement of time management

A validation question for the test asked about the usefulness of the INOV8 games for team work. Since the games are played individually, one should small scores to this request. The students performed well, with just 6% of the students giving good grades (Fig. 12). As for the good answers, 23% of the students have given grade 0 and 13% decided not answered to the question.



**Fig. 12.** Practice and improvement of team work

### 3. Conclusions

The students recognize the value of IBM INNOV8 games and understand the connection between the simulations from the games and the business process management aspects. The games are considered an easier and pleasant learning method by the students and they are appreciated by the professors because they are effective in training students with different cultural and educational backgrounds. We were inspired by the INNOV8 games results to participate in the Academic Initiative from IBM (2016) and we intent to enlarge the exploitation of serious games in the learning process.

### References

- Bulander, R. (2010). A Conceptual framework of serious games for higher education - conceptual framework of the game INNOV8 to train students in business process Modelling. *IEEE Proceedings of the 2010 International Conference on e-Business (ICE-B)*
- Bureau of Labor Statistics. (2015). American time use survey — 2015 Results, U.S. Department of Labor. Retrieved from <http://www.bls.gov/news.release/pdf/atus.pdf>
- Entertainment Software Association. (2015). Essential facts about the computer and video game industry. Retrieved from <http://www.theesa.com/wp-content/uploads/2015/04/ESA-Essential-Facts-2015.pdf>
- IBM. (2016). Academic Initiative. Retrieved from <https://developer.ibm.com/academic/>
- Morariu, J., & de Coutere, B. (2010). IBM's examples of social learning and immersive learning. *Conference ICL2010*, September 15 -17, 2010 Hasselt, Belgium
- Mustață, C., Trifan, E. L., & Hăntulie, C. (2016). Case study: Using the Topsim General Management 2 Business simulation software to develop the key entrepreneurship competences. *Proceedings of ELSE 2016 The 12th International Scientific Conference eLearning and Software for Education*, Bucharest, April 21-22, 2016
- Nichifor, C. C., Dascălu, M. I. & Neagu, A. M. (2016). Cognitive training games to improve learning skills. *Proceedings of ELSE 2016 The 12th International Scientific Conference eLearning and Software for Education, Bucharest*, April 21-22, 2016, doi: 10.12753/2066-026X-16-051. 360-366
- Păvăloiu, I. B., Dascălu, M. I., Vasilățeanu, A., Mitrea, D. A., Căruțașu, G., & Drăgoi, G. (2015). The simulated enterprise as a learning environment for a future career. *EDULEARN15, 7th International Conference on Education and New Learning Technologies*, ISBN: 978-84-606-8243-1, pp. 5427-5434
- Pavaloiu, I. B., Neagu, A.M., Roșu, S. M., & Dragoi, G. (2016a). Technical education in foreign languages, demands and opportunities. *INTED2016, The 10th annual International Technology, Education and Development Conference*, doi: 10.21125/inted.2016.0938, 8285-8291

- Pavaloiu, I.B., Neagu A.M., Roșu, S.M. & Dragoi, G. (2016b). IBM INNOV8 business simulation games for e-Learning. *Proceedings of ELSE 2016 The 10th International Scientific Conference eLearning and Software for Education*, Bucharest, April 21-22, 2016, doi: 10.12753/2066-026X-16-000
- Trifan, L., & Mustata, C. (2015). Inducing entrepreneurial behaviour by business management simulation games. *Edulearn15, 7th International Conference on Education and New Learning Technologies*, 4-8 Iulie 2015, Barcelona, Spania, ISBN 978-84-606-8243-1, pp. 6426-6433
- Vasilățeanu, A., Dascălu, M. I., Păvăloiu, I. B., Căruțașu, G. & Drăgoi, G. (2015). Interactive learning methods using a simulated enterprise. *Proceedings of ELSE 2015 The 11th International Scientific Conference eLearning and Software for Education*, Bucharest, April 23-24, 2015, doi: 10.12753/2066-026X-15-213, Vol. 3. 210-216
- Vasilateanu, A., Wyrzic, S., & Pavaloiu, B. (2016). A science fiction serious game for learning programming languages, *Proceedings of ELSE 2016 The 12th International Scientific Conference eLearning and Software for Education*, Bucharest, April 21-22, 2016, doi: 10.12753/2066-026X-16-082. 561-564
- Vuksic, V. B., Bach, M. P., & Hernaus, T. (2014). Educating students in business process management with simulation games. *International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering* Vol:8, No:5, 2014. 1236-1241