Game On! A Literature Review of Games and Simulations in Corporate Training

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Abstract

Corporations are in constant need of skilled employees. Individuals go to school for years just to get hired by these corporations. Once an individual begins employment with an organization, many believe that is the season of education is over…but a good corporation consistently provides training opportunities for its employees. Regardless of where the corporation is in the world, they are always looking for the best approaches and uses of technology to accomplish this goal. With the advent of newer technologies, companies are looking to engage remote employees with more advanced training simulations and games. Several studies have been conducted to date to show how having a little fun and engaging in a bit of role play can take existing training practices to a new level. In this literature review, a survey of over 30 articles was conducted to evaluate if the addition of games and simulations into existing pedagogical approaches would help students learn more effectively and efficiently in a corporate environment. Results show that games and simulations when used as a supplement to traditional training increase learning.

Keywords: games, simulations, e-learning, corporate training

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The use of games and simulations in training have been around for years. Some of the first business games were created in the 1930s and 1940s by former military officers (Guillén-Nieto & Aleson-Carbonell, 2012). Over the years, as technology has become more and more available in the workplace, corporate training departments have sought the best ways to train their company's employees more efficiently. One of the most important aspects of running a business is making sure the staff is effectively and efficiently trained to perform their given tasks (Vaz de Carvalho, Lopes, & Ramos, 2014). And that is the question: How does one effectively and efficiently train employees in a corporate setting? One answer is the use of games and simulations with educational technology.

Historically, the focus of educational technology is on that of academia, be it K-12 education or universities, but education extends beyond the walls of the classroom. Corporations of all sizes and industries have a need to continually educate their employees, that, in the ever-growing remote workforce, could be scattered across the globe. The need for innovative and engaging training practices is the goal for any corporate trainer. The purpose of this review is to determine, based on the literature surveyed, if the inclusion of games and simulations into corporate training plans increases learning.

This review is organized into six sections, the first 2 sections discuss methods and selection criteria for articles included in this review. Next, are 2 sections that discuss the background and current training methods. The fifth section reports on the data gathered from this review and how games and simulations can be an effective tool in corporate training. Finally, the conclusions and recommendations for future inquiry are presented.

Methods

To discuss the advantages of games and simulations in corporate training, the terms *games, simulations, simulation games,* and *serious games* must first be defined. For this literature review, the definitions supplied by Tao, Yeh, and Hung (2012) for *games* and *simulations* will be used. "A game has competitors, constraints, a linear objective and playability, whereas a simulation represents a real casual relationship and has a non-linear objective and non-terminating status" (p. 1352). Sitzmann's (2011)definition for s*imulation games* will be used and is defined as "instruction delivered via personal computer that immerses trainees in a decision-making exercise in an artificial environment in order to learn the consequences of their decisions" (p. 490). *Serious games* are defined as games played on an electronic device (computer, tablet, or smartphone) wherein the player only interacts with virtual elements of a game in a virtual reproduction of an environment (Vaz de Carvalho et al., 2014).

A spreadsheet was developed to record data on every article that included author, title, date, country of origin, technology used, an evaluation of the high points of the article, and whether the result of the article showed a positive or negative view of games and simulations in corporate training. This spreadsheet was modeled after Beck and Eno's methods spreadsheet (Beck & Eno, 2012).

Selection Criteria

The use of several different search strategies was employed to determine the 30+ articles and studies reviewed. Some articles were discarded after selection because the subject was not clearly related to the subject being studied. Search listings were limited to the following keywords: games and simulations in corporate training, serious games in corporate training, problems with corporate training, and games and simulations in business training. Databases

searched were ERIC, LearnTechLib, ProQuest, JSTOR, and Google Scholar. Scholarly articles were limited to primary sources produced within the past 23 years. Sources were reviewed chronologically to identify if technological advancements in games and simulations had any bearing on effectiveness.

Studies that analyzed games and simulations in a corporate training environment utilized a variety of techniques to generate research data. These techniques involved, pre-tests, post-tests, tests weeks after the training events, observations and surveys. Studies selected for review are representative of at least 17 different countries. Some studies covered a range of countries because of the use of virtual environments wherein several countries participated.

Background

To understand how games and simulations have an impact on learning in corporate training, one must first look at how adults learn. According to Dobrovolny (2006), "Learning is the process of personalizing new information and that process continues after learners 'complete' their instruction" (p. 161). Adults use the strategy of metacognition to construct and maintain knowledge. The act of thinking about thinking, or in this case, self-assessment and self-correction. In her 2006 study, Dobrovolny found that on average, interactive simulations were one of the more preferred methods of learning because it helps learners assess and correct their own practices (Dobrovolny, 2006). These types of activities reinforce the learning process through metacognition.

According to the research, adults look for learning strategies that allow them to test their knowledge in a *safe environment*. The term *safe environment* is used in this context to mean an environment wherein failure is an option and one that is expected so that students can learn valuable lessons from those failures. These are exactly the types of environments that games and

simulations provide (Douglas-Lenders, Holland, & Allen, 2017). Adults seek ways to generate knowledge and skills in ways that can be immediately applied and training opportunities where they are prepared for daily decision making (LeClair & Ferrell, 2000).

As mentioned earlier, having a properly trained staff is the goal of every company or corporation. A corporate environment being any professional environment not associated with education in primary, secondary, or post-secondary regards. Corporate training is all about training received from an employer. This could be training received from a fast food franchise or training received at a data company. Any environment wherein an employer is providing training to an employee is considered corporate training in the scope of this review. Before one can look to how games and simulations can influence corporate training, one must look at some of the current training methods available in companies today.

Current Training Methods

Reducing costs, increasing production, improving quality and reducing employee turnover are all objectives of corporate training (Loughrey & O'Broin, 2016). Current training methods in corporate education are very similar to those in academics: instructor led classroom training, live virtual training (synchronous), training-on-demand, also known as just-in-time training (asynchronous), and bootcamps (all day or multi-day intensives/workshops) (Loughrey & O'Broin, 2016). As time tested as these practices are, there are flaws in each approach. This is not to infer that games and simulations have no weaknesses, it is just to point out that every method, if used exclusively, can limit the effectiveness of the training (Lau & Lee, 2016). For example, in traditional instructor-led training or bootcamps, space is limited and not all individuals that need the training may be able to attend training due to travel, budget, space accommodation, etc. Instructor-led training also introduces an external influence (the presence

instructor and class) that may add pressure to the completion of training activities (Brown, 2001). Instructor-led training and workshops are not easily reproducible or cost effective to do so. Live virtual training can alleviate several of these issues, but then the instructor and student are limited to topics that do not require physical interaction. Training-on-demand sessions do not allow for a question and answer with a subject matter expert (SME). Therefore, if a student has an issue, that issue cannot be resolved and learning is hindered. Employee motivation is another aspect that needs to be considered when developing training content via the methods mentioned. If employees are not motivated to attend the training, they will seldom be engaged (Loughrey & O'Broin, 2016).

Even with the presented shortcomings of each delivery method, these still represent a valuable collection of training methods when instruction is developed with the delivery in mind. Live virtual training and training-on-demand (collectively referred to as *e-learning*) are attractive forms of education to the corporate world because of the cost benefits associated with an electronic, technology-based solution. Other benefits of e-learning include "increased productivity, improved employee retention and recruiting, a more agile and competitive organization, and a rapid return on investment"(Lai & Liou, 2010, p. 5). Just-in-time training provides an alternate form of education to students that require knowledge for a particular topic and not necessarily an entire course (Kopp & Burkle, 2010). With these methods in mind, let's look at how games and simulations can be a much-needed addition to an existing training plan and increase learning.

Games and Simulations

Can games and simulations improve the effectiveness and efficiency of corporate training? To answer this question and to understand the full impact that games and simulations

have on corporate training, it is important to look at the different components of games and simulations. These components include environments, psychological and philosophical approach, roles, types of technology, and potential pitfalls when utilizing games and simulations.

Environments

Simulations provide a controlled environment for the most efficient learning processes to occur (Ebner & Efron, 2005). Participants can use artificial environments to experiment and make mistakes to develop skills. These environments also allow for observers to coach and assess participants' skills (Lane, 1995). Games and simulations provide the safe environments that adults need to encourage learning. These environments also facilitate and support metacognition to reinforce learning. These are just 2 ways that games and simulations check the boxes necessary for adult learning.

Simulations allow students to actively apply knowledge learned and this knowledge application can provide an experience that is fun, engaging, and applicable to their work (Ben-Zvi, 2010; Schoonheim, Heyden, & Wiecha, 2014; Sparling, 2002; Uhles, Weimer-Elder, & Lee, 2008). Simulation environments also provide a link between what is leaned in a classroom with what is expected in the real world. This is accomplished by providing a place for students to gain experience wrestling with complex problems (Ceschi, Dorofeeva, & Sartori, 2014). Environments and game play can be highly realistic (Ben-Zvi, 2010), based on a pseudo-reality (Ebner & Efron, 2005), standardized to match specific rules (Smutny, Prochazka, & Vaculik, 2016), or entirely fantastical and virtually constructed. Some students even prefer this type of environment to a face-to-face setting (Schoonheim et al., 2014).

Psychological and Philosophical Approach

Simulation learning is an example of experiential learning and constructivism, and follows Kolb's theory wherein the student learns through gaining experience, thinking about that experience, forming abstract concepts to this reflection, and experimenting with those concepts (Angehrn & Maxwell, 2009; Ben-Zvi, 2010; Douglas-Lenders et al., 2017; Eckhaus, Klein, & Kantor, 2017; Siewiorek, Gegenfurtner, Lainema, Saarinen, & Lehtinen, 2013; Tao et al., 2012). Games and simulations gives players the freedom to make decisions (van der Zee, D J & Slomp, 2009). This decision-making activity is the heart of applying what has been learned.

According to Guillen-Nieto and Aleson-Carbonell (2012), one of the reasons that serious games have become so popular is due to change in the field of teaching and learning. They state that this change:

> has brought three significant changes: (a) the shift from a teacher-centered approach to a learner-centered approach, (b) the shift from a model of instruction based on listening to a model of instruction based on doing and interaction, and (c) the shift from a concept of learning based on memory to a concept of learning based on the capacity to find and use information. (p. 436)

Simulations allow students to problem solve. They require students to apply cognitive and metacognitive capabilities to execute a role in the simulation (Ceschi et al., 2014). This allows the student to put into practice that which he/she has learned, further cementing that knowledge in long-term memory.

Games and simulations are useful in increasing an individuals work-related self-efficacy. The combination of safe environments coupled with the ability to engage in experiential learning

helps the learner become more confident in their ability to perform certain tasks as they relate to their jobs (Douglas-Lenders et al., 2017; Sitzmann, 2011).

It was mentioned early in the Environments section, but the fact that simulations can be *fun* is something that should not be overlooked in game and simulation development. The *fun* aspect of a game, relating to its entertainment value, plays a psychological part in the effectiveness of the game or simulation involved. This aspect of the game is what keeps learners engaged (Lau & Lee, 2016). If learners are not engaged, then they will not stay focused. No focus leads to a decrease in learning. This is where researchers feel that gamification can engage learners. Gamification is "the use of game design elements in non-game contexts" (Loughrey & O'Broin, 2016, p. 990). By designing training with game elements, the users become more engaged and focused and learning becomes a natural result of the interaction. Examples of gamification in training would be awarding badges or achievements for completing tasks or assignments.

Roles

Games and simulations allow for learners to assume the roles of various *characters*. These roles may be directly related to the learner's current, real-life job role, or they can be a shift in responsibilities. Shifting the roles in simulations is meant to get the learner outside of themselves and keep them from focusing too much on their tasks. This encourages a more wholistic view of company operations (van der Zee, D J & Slomp, 2009).

The role assumed by a learner can be that of a solo character in a simulation or the learner can be part of a team. Team simulations provide not only an opportunity for individuals to experiment with new knowledge, but to also strengthen interpersonal relationship skills (Ceschi et al., 2014). As fun as assuming a different role may sound, some individuals may not feel comfortable playing a role in the simulation due to personal experiences or belief systems. If forced to

continue this path, the individual can make the simulation or game miserable for all in attendance and completely derail the learning event (Ebner & Efron, 2005). It is advised that this be taken into consideration when developing an instructional plan.

Types of Technology

Games and simulations can be presented in a variety of methods. In the past, they have primarily been pen and paper, board games, computer/web-based, mobile apps, or in-person simulations/workshops. One may not think a board game can be an effective training tool, but studies show that they can be valuable educational tools in management education (Eckhaus et al., 2017).

In the past 10 years, new technology is seen being utilized for educational purposes in corporate training. The advent of virtual worlds provides an additional component to games and simulations in which users can interact in a virtual community to practice learned skills. Studies utilizing the virtual world, *Second Life*, indicated a "statistically significant increase in all of the participants' perceived ability to meet the course objectives, their level of confidence in providing and receiving feedback, and level of comfort in role-playing situations" (Broadribb & Carter, 2009, p. 549). In the same study, researchers discovered what they described as *direct* and *indirect* learning. Direct learning refers to activity within the virtual world and indirect learning refers to the learning that occurs outside of the game or simulation wherein the group members engage in a constructive dialogue (Broadribb & Carter, 2009).

Virtual worlds also allow for types of social interaction to occur that training on demand cannot accommodate. Learners that do not experience this social interaction may feel isolated and lose motivation. Whereas those that do experience it are able to share ideas with one another to increase the *learning-by-doing* aspect of the simulation (Gustafson-Pearce & Grant, 2016).

Another distinct advantage of utilizing games and simulations in a virtual or online environment is that they can be utilized regardless of geographic location (Bucurean, Tarca, & Marcu, 2010; Sitnikov, Kruk, Zhuravleva, & Chupakhina, 2010). If the necessary network infrastructure is available, games and simulations can unite teams from all over the world to take part in corporate training events (Kopp & Burkle, 2010). With the increase in internet dependability around the world, virtual training that includes simulations has become an even more reliable method of training (Schoonheim et al., 2014).

The accessibility factor of virtual or online environments also leads to an increase in learning when students can access the simulations as often as they desire (Sitzmann, 2011). Other benefits of utilizing virtual or online environments include the elimination of logistics concerning in-person training workshops as well as the need for a dedicated instructor (Wan, Tadikonda, & Kuriger, 2011).

As technology becomes more and more advanced, the types and quality of training increases (Douglas-Lenders et al., 2017). Older generations would not have thought to use a virtual world for training, but now it is an option. This generation and generations to come should have no problem adapting to these new technologies (Lau, 2015). But, as wonderful as it is to think about how well-designed games and simulations can be as an addition to existing training plans, one must also consider the potential missteps that can occur with this technology.

Potential Pitfalls

There are a few areas to be cautious of when implementing games and simulations. Sitzmann (2011) concluded that when simulations games are used alongside other training methods, learning increases, but when simulations games are used solely as the means of education, learning decreases. It has also been suggested by researchers that conventional, instructor led

training be combined with virtual training to produce greater results in learning (Lau, 2015; Lau & Lee, 2016). Never rely solely on games and simulations. Rather they should be just another arrow in the quiver of an instructional designer.

Another potentially negative effect of games and simulations largely depends on one thing: the people involved. Some people do not like the role-playing aspect of games and could prevent learning from occurring. Occasionally, individuals do not like or are threatened by collaboration (Angehrn & Maxwell, 2009), so as an instructional designer, this must be taken into consideration. Personality types need to be considered when conducting game or simulation training sessions.

If utilizing computers or virtual worlds for games and simulations, there is always the possibility of technical issues arising during the simulation. Even though internet connectivity is much better throughout the world, issues still arise with connectivity, sound, bandwidth, and so on (Schoonheim et al., 2014).

The cost of games and simulations also must be considered when evaluating their inclusion in instruction. Depending on the company, developing custom computer-based simulation games can become cost prohibitive (Sitzmann, 2011). There are alternatives to this, though. Companies can purchase packaged, off-the-shelf simulations that will cost them considerably less. Companies trade simulation customization for a lesser cost. Regardless, the tools selected must be effective as they are fundamental to the success of the training program (Vaz de Carvalho et al., 2014).

Instructional designers need to be mindful of how the games or simulations are being consumed. In other aspects of society, there is a push to manufacture content to be consumed via a smartphone or tablet, but research suggests that e-learning is best consumed via a desktop

computer. There are instances where smartphones and tablets can be utilized (videos and mobile app games), but overall, learners expressed a preference for engaging e-learning content via a desktop computer (Loughrey & O'Broin, 2016).

Be mindful of every aspect of your instructional design and why games and simulations are being considered. Games and simulations should not be included just for the sake of inclusion, but rather they should be included because it would help support the learning.

Conclusion

This review started with the question as to whether the inclusion of games and simulations in existing pedagogical approaches could provide for more effective and efficient training in a corporate environment. All studies reviewed where games and simulations were utilized and studied in a corporate learning environment displayed positive results. Wherein, positive results equal an increase in learning when games or simulations were included as part of the pedagogical approach. It should be noted that games and simulations are not a magic fix that will suddenly transform a training department's efficiency. Games and simulations are meant to enhance the learning process; not completely replace existing pedagogy. Studies showed that, regardless of the medium, the quality of learning is directly proportional to the quality of the instructional design (Kopp & Burkle, 2010). Employees must be engaged in learning, and well-designed games and simulations provide a more engaging environment. According to Brown (2001), the employees that learn are the ones that invest their time and effort in the training. Sitzmann (2011) concludes that participants that actively, rather than passively, engage in the simulation games maximized their learning.

Areas for future research include researching actual costs associated with games and simulations. This would include researching the effectiveness of custom developed games and

simulations vs. pre-built stock games and simulations. Not only costs associated with purchasing the game or simulation package, which could range from a board game to a full, multi-day simulation workshop, but costs associated with lost productivity due to employees being absent from their daily tasks and if that tradeoff is beneficial. Additional research is also needed as to the best types of games and simulations that keep the employees focused on the game or simulation and not distracted thinking about tasks they are missing from their day to day routine. Even though there are still areas that need to be studied, I feel that it is safe to conclude that games and simulations added to existing corporate training increases learning.

References

Angehrn, A. A., & Maxwell, K. (2009). Eagle racing: Addressing corporate collaboration challenges through an online simulation game. *Innovate: Journal of Online Education, 5*(6) Retrieved from https://www.learntechlib.org/p/104306

Beck, D., & Eno, J. (2012). Signature pedagogy: A literature review of social studies and technology research. *Computers in the Schools, 29*(1), 70-94. Retrieved from http://dx.doi.org/10.1080/07380569.2012.658347

Ben-Zvi, T. (2010). The efficacy of business simulation games in creating decision support systems: An experimental investigation. *Decision Support Systems, 49*(1), 61-69. //doi.org/10.1016/j.dss.2010.01.002 Retrieved from http://www.sciencedirect.com/science/article/pii/S0167923610000151

Broadribb, S., & Carter, C. (2009). Using second life in human resource development. *British Journal of Educational Technology, 40*(3), 547-550. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=tfh&AN=37605540&site=ehost-live&scope=site

Brown, K. G. (2001). Using computers to deliver training: Which employees learn and why? *Personnel Psychology, 54*(2), 271-296. Retrieved from http://0-search.proquest.com.library.uark.edu/docview/220145162?accountid=8361

Bucurean, M., Tarca, N., & Marcu, M. (2010). The new trends of simulation games for managerial training. *Annals of the Oradea University: Fascicle Management and Technological Engineering, 9*(19) Retrieved from https://doaj.org/article/0e04a30983b6407099b2967e0c54e0f5

Ceschi, A., Dorofeeva, K., & Sartori, R. (2014). Studying teamwork and team climate by using a business simulation: How communication and innovation can improve group learning and decision-making performance. *Euro J of Training and Dev, 38*(3), 211-230. 10.1108/EJTD-01-2013-0004 Retrieved from https://0-doi-org.library.uark.edu/10.1108/EJTD-01-2013-0004

Dobrovolny, J. (2006). How adults learn from self-paced, technology-based corporate training: New focus for learners, new focus for designers. *Distance Education, 27*(2), 155-170. Retrieved from http://0-search.proquest.com.library.uark.edu/docview/217783015?accountid=8361

Douglas-Lenders, R., Holland, P. J., & Allen, B. (2017). Building a better workforce: A case study in management simulations and experiential learning in the construction industry. *Education + Training*, *59*(1), 2-14. 10.1108/ET-10-2015-0095 Retrieved from https://0-doi-org.library.uark.edu/10.1108/ET-10-2015-0095

Ebner, N., & Efron, Y. (2005). Using tomorrow's headlines for today's training: Creating pseudo-reality in conflict resolution simulation games. *Negotiation Journal, 21*(3), 377-393. Retrieved from http://search.proquest.com/docview/205191733?accountid=8361

Eckhaus, E., Klein, G., & Kantor, J. (2017). Experiential learning in management education. *Business, Management and Education, 15*(1), 42-56. //dx.doi.org/10.3846/bme.2017.345 Retrieved from http://search.proquest.com/docview/1915013630?accountid=8361

Guillén-Nieto, V., & Aleson-Carbonell, M. (2012). Serious games and learning effectiveness: The case of it's a deal! *Computers & Education, 58*(1), 435-448. //doi.org/10.1016/j.compedu.2011.07.015 Retrieved from http://www.sciencedirect.com/science/article/pii/S0360131511001734

Gustafson-Pearce, O., & Grant, S. (2016). (2016). Supply chain knowledge networking using a 3D virtual world environment. Paper presented at the *The European Conference on Information Systems Management*, 68-75. Retrieved from http://0-search.proquest.com.library.uark.edu/docview/1949088916?accountid=8361

Kopp, G., & Burkle, M. (2010). Using second life for just-in-time training: Building teaching frameworks in virtual worlds. *International Journal of Advanced Corporate Learning, 3*(3), 19-25. 10.3991/ijac.v3i3.1373 Retrieved from http://0-search.ebscohost.com.library.uark.edu/login.aspx?direct=true&db=bth&AN=52869622&site=ehost-live&scope=site

Lai, C., & Liou, W. (2010). Implementation of E-learning and corporate performance: An empirical investigation. *International Journal of Advanced Corporate Learning (iJAC), 3*(1), 4-10. Retrieved from https://www.learntechlib.org/p/45624

Lane, D. C. (1995). On a resurgence of management simulations and games. *The Journal of the Operational Research Society, 46*(5), 604-625. 10.2307/2584534 Retrieved from http://www.jstor.org/stable/2584534

Lau, K. W. (2015). Organizational learning goes virtual? *The Learning Organization*, *22*(5), 289-303. Retrieved from http://0-search.proquest.com.library.uark.edu/docview/1714558733?accountid=8361

Lau, K. W., & Lee, P. Y. (2016). Designing employees' training by immersive serious games? A study of digital natives' satisfaction, perception and expectation in corporate training practices. *Development and Learning in Organizations, 30*(4), 6-8. Retrieved from https://0-search-proquest-

com.library.uark.edu/docview/1826444414/fulltext/13F3DBDB4D854575PQ/1?accountid=8361

LeClair, D. T., & Ferrell, L. (2000). Innovation in experiential business ethics training. *Journal of Business Ethics, 23*(3), 313-322. Retrieved from http://www.jstor.org/stable/25074247

Loughrey, K., & O'Broin, D. (2016). (2016). Gaming in corporate learning environments. Paper presented at the *European Conference on Games Based Learning*, 990-998. Retrieved from http://0-search.proquest.com.library.uark.edu/docview/1859715095?accountid=8361

Schoonheim, M., Heyden, R., & Wiecha, J. M. (2014). Use of a virtual world computer environment for international distance education: Lessons from a pilot project using second life. *BMC Medical Education, 14*(1), 36. 10.1186/1472-6920-14-36 Retrieved from https://doi.org/10.1186/1472-6920-14-36

Siewiorek, A., Gegenfurtner, A., Lainema, T., Saarinen, E., & Lehtinen, E. (2013). The effects of computer-simulation game training on participants' opinions on leadership styles. *British Journal of Educational Technology, 44*(6), 1012-1035. 10.1111/bjet.12084 Retrieved from http://0-search.ebscohost.com.library.uark.edu/login.aspx?direct=true&db=tfh&AN=91255391&site=ehost-live&scope=site

Sitnikov, S., Kruk, B., Zhuravleva, O., & Chupakhina, N. (2010). Corporate E-learning strategy. *International Journal of Advanced Corporate Learning (iJAC), 3*(4), 41-44. Retrieved from https://www.learntechlib.org/p/45685

Sitzmann, T. (2011). A meta-analytic examination of the instructional effectiveness of computer-based simulation games. *Personnel Psychology, 64*(2), 489-528. 10.1111/j.1744-

6570.2011.01190.x Retrieved from https://0-doi-org.library.uark.edu/10.1111/j.1744-6570.2011.01190.x

Smutny, P., Prochazka, J., & Vaculik, M. (2016). The relationship between managerial skills and managerial effectiveness in managerial simulation game. *Innovar, 26*(62), 11-22. Retrieved from http://0-search.proquest.com.library.uark.edu/docview/1837592250?accountid=8361

Sparling, D. (2002). Simulations and supply chains: Strategies for teaching supply chain management. *Supply Chain Management, 7*(5), 334-342. Retrieved from http://0-search.proquest.com.library.uark.edu/docview/216864361?accountid=8361

Tao, Y., Yeh, C. R., & Hung, K. C. (2012). Effects of the heterogeneity of game complexity and user population in learning performance of business simulation games. *Computers & Education, 59*(4), 1350-1360. //doi.org/10.1016/j.compedu.2012.06.003 Retrieved from http://www.sciencedirect.com/science/article/pii/S0360131512001455

Uhles, N., Weimer-Elder, B., & Lee, J. G. (2008). Simulation game provides financial management training. *Healthcare Financial Management, 62*(1), 82-88. Retrieved from http://0-search.proquest.com.library.uark.edu/docview/196388888?accountid=8361

van der Zee, D J, & Slomp, J. (2009). Simulation as a tool for gaming and training in operations management—a case study. *Journal of Simulation, 3*(1), 17-28. 10.1057/jos.2008.8 Retrieved from https://doi.org/10.1057/jos.2008.8

Vaz de Carvalho, C., Lopes, M., & Ramos, A. (2014). Lean games approaches – simulation games and digital serious games. *International Journal of Advanced Corporate Learning (iJAC), 7*(1), 11-16. Retrieved from https://0-www-learntechlib-org.library.uark.edu/p/148066/

Wan, H., Tadikonda, B. M., & Kuriger, G. (2011). Lean training via computer: Two flash-based simulation games. *IIE Annual Conference.Proceedings,* , 1-8. Retrieved from http://0-search.proquest.com.library.uark.edu/docview/1190409581?accountid=8361