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# Leadership simulations as a teaching and learning tool at universities: A single-player example

## Abstract

Computer-based simulations are important didactic tools that allow connections between theory and practice, making them particularly valuable in the field of leadership. However, the predominant multiplayer format hinders their widespread use in undergraduate and postgraduate business education. We present a single-player simulation in progress 'LeadSim' which focuses on team leadership rather than a general business context. 'LeadSim' aims to develop personal competence and provide feedback on the consequences of individual decisions. Moreover, its design makes it convenient to use. Here, we discuss the advantages and limitations of this format in the context of leadership education in universities.

## Keywords

leadership simulation, single-player design, leadership competence, experiential learning, LeadSim

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“The business environment is so turbulent that running a business or managing a project team can be as treacherous as piloting an aircraft. The uncomfortable reality in most organizations is that people are making more complex decisions in less time, with fewer resources and no margin for error. Being great requires something few people have – opportunities to practice. That’s the value of simulation.” Suda (2017, p. 2).

## 1 Introduction

Leadership is widely acknowledged as one of the primary sources of competitive advantage and productivity for organisations. Leaders set goals and, by managing work processes, communicating with, and motivating employees, guide and control a group of individuals to achieve these goals (e.g., HICKS & GULLET, 1975; PASTOORS et al., 2019). Learning leadership is a complex task (HORNETT & LEE, 2017) as leadership competence is multidimensional and encompasses various skills as well as social and personal competencies (PASTOORS et al., 2019). Naturally, the development of leaders requires support through both formal and informal education (BENNIS, 1990).

When it comes to leadership learning, or more broadly, management learning in higher education, traditional textbook knowledge and case studies offered in most undergraduate and postgraduate business education programs (LEE, 2012) are insufficient to enable learners to master the challenges typically encountered by leaders. Therefore, an increasing number of universities are seeking new approaches to provide students with experiential learning opportunities directly in the classroom (FARIA, 1998; WADDELL et al., 2018). In this regard, computer-based simulations and role-playing games (RPGs) are gaining popularity, as they not only allow learners to apply theoretical knowledge in practical scenarios and experiments with their own behaviour and strategies but also actively support learning motivation and knowledge transfer through their interactive and realistic design (ALISON et al., 2013; BUIL et al., 2019 etc.).

Most publications on simulation-based learning focus on multiplayer formats, particularly in the context of business RPGs. In these simulations, individuals collaboratively learn how to manage a business by setting strategic goals, establishing organizational processes, and collectively solving operational tasks (HERNÁNDEZ LARA et al., 2018; FARIA, 1998). This format is well-suited for developing general management competencies, as groups compete to maximise business performance. However, it is less suitable for the deliberate development of leadership-related personal competences, such as situational awareness, decision-making capability, responsibility, and risk tolerance as well as the competence to build trust, manage conflicts, motivate, and handle ‘difficult’ employees within the context of projects or teamwork. In addition, the presence of other players may create social pressure that hinders learners’ individual experimentation (HARTEVELD & BEKEBREDE, 2011).

In this study, we address the question of how digital single-player simulations can facilitate the development of leadership skills in higher education. We contribute to the literature on higher education didactics by critically and systematically discussing the conventional design of simulations of multiplayer RPGs. In addition, we introduce a new format for leadership teaching that specifically addresses the following criteria:

1. Context of simulation. We focus on team leadership, emphasising the balance between organizational performance and employee acceptance, rather than performance maximisation.
2. Focus competencies: Our simulation emphasises the development of personal competencies instead of general management competencies.
3. Opportunities for individual experimentation: Learners have the chance to experiment with their individual behaviours and strategies and trace the effects back to their causes.
4. Feedback during the simulation: We provide feedback to learners throughout the simulation.
5. Social dynamics in individual learning: Social dynamics may not emerge in a single-player format.

We designed ‘LeadSim (Leadership Simulator)’ as an interactive walkthrough of a branched series of structured critical incidents, representing situations from leaders’ everyday lives that require decisions under high ambiguity, complexity, and risks. Feedback is provided to help learners understand the consequences of their choices and their resulting developmental paths. This approach stimulates individual sense-making processes and supports learning motivation. Unlike multiplayer simulations, in ‘LeadSim’, the challenges that arise depend solely on the learner’s actions, rather than the behaviours of other players, ensuring that the learning process is independent of potential social dynamics.

Using the example of ‘LeadSim’, we demonstrate how single-player simulations can address important didactic and organizational concerns associated with existing formats of leadership education and, thus, provide a promising alternative or a supplement to them. Single-player simulations offer equal learning opportunities to all students, can be accessed at any time (e.g., as a self-learning tool), and result in significantly lower coordination and organizational costs than multiplayer formats (DIGGELEN et al., 2010).

In the following sections, we first discuss the main construction principles and formats of simulations applied in management education. We then highlight the limitations of multiplayer formats and present our new single-player simulation format, critically evaluating it from a didactic perspective.

## **2 Leadership simulations in higher education: Common characteristics and designs**

Simulations and RPGs have proven effective at universities (MARTENS et al., 2008) and are gaining popularity in management and leadership teaching because they can generate didactic value added. These methods leverage elements of fun, realism, and complexity (GARCIA et al., 2016) and, with the help of digital technologies, offer a more interactive learning experience. They integrate adaptive content and create virtual environments and characters, allowing for learning from experience and making the learning process more interesting, flexible, and intuitive. Numerous empirical studies have demonstrated the benefits of using simulations in

leadership education and training. They increase participants' engagement, foster intrinsic motivation (BUIL et al., 2019) and facilitate the development of leadership skills (SIEWIOREK et al., 2013). XU and YANG (2010) found that social interactions and psychological safety positively contribute to the development of synergistic knowledge and complex mental models. Several studies have documented the significant positive effects of using simulation methods on learning or perceived learning outcomes (e.g., SCHMIDT-HUBER et al., 2017; HORNETT & LEE, 2017; BUIL et al., 2019).

There is a great variety of simulations differing in technological sophistication, skills they aim to teach, and design (HARTEVELD & BEKEBREDE, 2011; MARTENS et al., 2008), among other factors. Most commonly, simulations are designed as *interactive multiplayer role-playing games*. In these games, groups of individuals, each led by a manager, interact with a computer-mediated system and compete with one another while operating a business (e.g., FITÓ-BERTRAN et al., 2014; HERNÁNDEZ LARA et al., 2018; BUIL et al., 2019; KUKENBERGER & D'INNOCENZO, 2020).

While these simulations are widely accepted in teaching and are frequently used, they are primarily designed for general management applications rather than (team) leadership education programs. In these simulations, the manager's role is similar to that of the CEO, managing team processes and current business performance. Although the existing simulations concentrate on the development of general management skills relevant at the organizational level, they do not adequately support the development of genuine leadership competencies, such as purposefully influencing employees' behaviours, building trust, managing expectations in a team, or motivating employees, which are important at lower managerial levels. Furthermore, the final performance outcome in these simulations often depends on aggregated team efforts and cannot be attributed to specific individual decisions, thereby limiting opportunities to learn from errors and reflect on one's own actions.

The involvement of multiple players has some additional limitations. First, because of the communication between players, these simulations often focus on training teamwork competence and soft skills, paying insufficient attention to the development of personal competence. Second, participants' decisions are often influenced by the behaviours of other players, making them contingent on group characteristics and social dynamics (e.g., conflicts). This not only biases learning, but also reduces

educators' control over the environment and the predictability of learning outcomes (HARTEVELD & BEKEBREDE, 2011). Third, in a group, only one person holds the leadership position at a time. Thus, providing all learners, particularly in large programs or courses, with an equal chance of acquiring leadership-relevant experiences can be very time-consuming and requires significant coordination.

By contrast, *single-player simulations* can be pursued individually by each participant. These simulations often rely on a series of real-life problems framed as 'critical incidents' (FLANAGAN, 1954) that involve high risks, costs, and complexity. The importance of a critical incident approach in leadership training has become increasingly recognised (EBERT-STEINHÜBEL, 2021). The use of comprehensive three-dimensional, virtual/augmented reality or artificial intelligence technologies (as seen in BUNÆS and KARLSEN (2019) and GORDON et al. (2004)) aims to create immersive environments and further support learning motivation.

While these simulations are typically applied to leadership and decision-making training in domains with access to systematically documented critical incidents (e.g., aviation, medicine, military, police, or fire emergency scenarios, ALISON et al., 2013), they are not as commonly used in business settings (e.g., GURLEY & WILSON, 2011). In the business context, critical incidents do not describe life-endangering disruptive events but rather represent situations or problems with no single clear solution, where multiple answers may be considered 'correct', leading to different developmental scenarios (RITTEL & WEBBER, 1973). Developing such simulations requires experts with a solid theoretical knowledge base intertwined with practical expertise and expertise to ensure a realistic representation of the decision-making context. In addition, the advanced graphic design of simulations makes them expensive to develop or purchase for use in higher education (MARTENS et al., 2008).

Therefore, there is a need to fill this gap with simulations that meet the demands of (team)leadership courses at universities, while considering various didactic and financial constraints.

In the next section, we introduce a single-player branched leadership simulation (available in the future under a creative commons licence). This simulation was designed to develop team leadership competencies rather than general management

skills based on the critical incidents' method. This can also be applied to leadership education in universities and other educational contexts.

## 3 The concept of 'LeadSim'

### 3.1 Simulation framework

'LeadSim' is a single-player leadership simulation designed as a practice-oriented, electronic teaching instrument. It relies on insights from real organizational practices and is supported by leadership theory, with a particular focus on motivational, social-psychological, and communication-related aspects of work behaviour in the organizational context. Participants are expected to apply their theoretical knowledge to an abstract, yet realistic environment. For learning, they also have the opportunity to reevaluate their decisions and explore the consequences of different approaches.

We simulate a web-design and marketing agency called 'Classic and Digital Ltd. (C&D)'. Based on extensive literature and factual research, we developed a fictitious (yet realistic) company history, organizational structure, and team composition, including characters representing the employees who work under the guidance of the simulation participant. Each virtual team member possesses individual traits and expertise parameters as well as measures of effectiveness, engagement, and creativity. Moreover, as in real-life scenarios, team members establish networks, form social and business relationships, and develop varying levels of mutual affinity or antipathy. Figure 1 presents the sociogram outlining the Design Department of C&D, including the key characteristics of the characters and their formal and informal relationships. Learners can access more detailed personnel files of team members of interest, if necessary.

During the 'LeadSim' simulation, learners immerse in a social environment characterised by relationships, emotions, and attitudes. Additionally, there is an interaction between the learner's decisions and the surrounding environment, as each decision leads to a subsequent critical incident and the potential for changes in the situation (e.g., team dynamics). For instance, if a learner displays low willingness to listen to a particular employee, other team members may become frustrated with the leadership style, subsequently reducing their efforts and efficiency.





One of the most important clients of C&D - „Monsum AG“ - is headquartered in the USA and insists on the personal attendance of your team member Dr. Schneider during ist' next boad meeting. Dr. Schneider is a well-known expert in his field and is, thus, the most qualified presenter of a new design concept, developed by C&D for this firm. However, Dr. Schneider has ecological concerns and categorically rejects the business trip in the USA.

You have already promised your client that Dr. Schneider will fly. How will you handle this situation?

**A** You accept Dr. Schneider's position this time, but ask him not to prioritize his beliefs over the firm success next time. You inform your client that it was your mistake to (too rashly) promise that Dr. Schneider would be physically present during the board meeting of „Monsum AG“.

**B** You threaten Dr. Schneider with dismissal if he will not fly.

**C** You explain your client the reason why Dr. Schneider will not be able to fly and offer two alternatives: either the concept will be presented by Dr. Schneider per Video-Conference or by another team member who is ready to fly.

**D** You enthusiastically explain your client why Dr. Schneider will not fly. You emphasize that you think about the global warming in exactly the same way as Dr. Schneider and finally meet the person who has enough courage to consistently act in accordance with his/her beliefs.

Classics Digital GmbH  
Web-Design and MarketInexperts

Fig. 2: Example of the episode in 'LeadSim' (licence free images from pixabay.com)

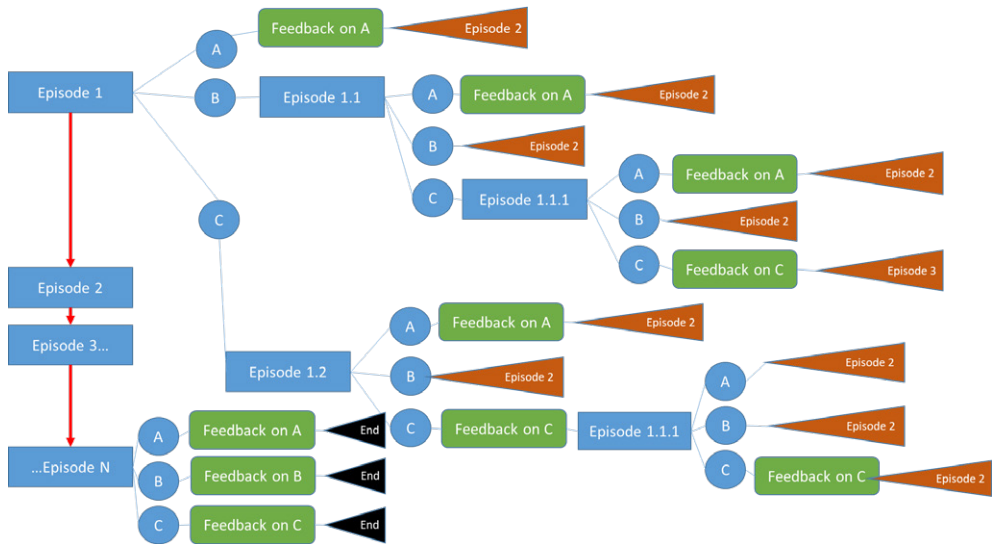


Fig. 3: Decision tree

### 3.2 Didactic merits of ‘LeadSim’

‘LeadSim’, a dynamic single-player leadership simulation, is expected to benefit both learners and educators by providing a unique format that personalises the learning process and enriches the methodological toolbox of the teaching staff.

This simulation places learners in a ‘cockpit’ where they pilot a virtual team. As no direct coordination with other participants is necessary, this reduces the pressure to choose normatively or socially desired solutions. For example, simulation participants can explore the ‘dark side’ of leadership and gain insights into the potential consequences of their ineffective or unethical actions, which could be painful or costly in reality. This learning experience helps them become more aware of such leadership strategies and avoid them in the future.

As a part of the simulation design, learners trigger built-in mechanisms and learn to cope with the direct side effects of their actions. The system provides additional feedback, including theory-based or practice-driven commentaries, on strategies that stimulate reflection processes. Ideally, this experiential learning method should be strengthened through debriefing sessions, where the instructor can purposefully direct learners' attention to specific problems or effects.

'LeadSim' simulates not only the organizational environment, but also team interactions, including communication with partners at different hierarchical levels. It encompasses various interaction scenarios and social processes, such as power games in organisations and navigating social rules, bids, and prohibitions. Simulations allow learners to attempt different social strategies and provide feedback on their preferred or alternative leadership styles.

Unlike multiplayer games, single-player simulations require relatively little organizational effort in terms of planning, scheduling, and coordination. Each student can work independently or at any time. The chosen alternatives and paths are saved during 'LeadSim', and feedback on individual decisions and actions is provided. Post-simulation feedback conversations or group debriefings can be scheduled flexibly during relevant programmes or courses.

As a didactic tool, 'LeadSim' can be easily implemented, adjusted, and developed at low financial costs. It can be integrated into the leading open-source learning management platform Moodle, if desired. The developed scenario, which focuses on the first year of a leadership position at a web design and marketing agency, is only one possible application. Other scenarios within different industrial contexts, teams, or those with a focus on specific storylines can be developed and openly shared with communities. This allows educators to design or adapt individual scenarios to address specific competencies, such as managing stressful and conflicting situations or communicating with difficult employees by integrating relevant episodes into the simulation.

### 3.3 Limitations of ‘LeadSim’

Although ‘LeadSim’ was developed based on a thorough search of business cases, development scenarios, and market data, there is still a concern that not all participants will perceive the simulation as authentic and engage in learning processes beyond mere playing. While playing without any real costs can be useful, it can be criticised, as individuals may behave similarly but not exactly the same as in reality (ALISON et al., 2013). However, previous studies have highlighted that the interactions between different simulation elements and the dynamic nature of the simulation are likely to decrease the risk of these drawbacks. If the setting, with its uncertainty, time pressure, and tension, is perceived as challenging, most participants will be motivated, experience it realistically, and behave authentically (BREHMER & DOERNER, 1993; BUIL et al., 2019). Another related concern is the potential discrepancy between intended and actual learning effects. To address these potential undesired effects and ensure the high quality of the simulation, we relied on an ongoing iterative, interdisciplinary exchange within the development team, as well as piloting and evaluating prototypes with students.

The next concern is related to the validity of the simulation. It remains uncertain whether individual-level simulations equip learners with the relevant skills without the possibility of interacting in real situations. To maintain the fidelity of the simulation, developers must simulate team processes, including team member interactions, communication, information exchange, emotions, and attitudes as possible reactions to team members’ actions. It is important to keep in mind that real meetings differ from episodes and designed workplace interactions are not real conversations. ‘LeadSim’ primarily focuses on the development of personal competences and is not intended to fully replace multiplayer simulation-based teaching tools. Instead, this single-player simulation can complement group-level simulations because both personal and team competencies are important in leadership positions. Encouragingly, simulation-based research with virtual team members provides optimistic evidence of the possibility to learn from realistic, rather than ‘perfect’, virtual team members (DIGGELEN et al., 2010). Moreover, SCHAAFSTAL et al. (2002) documented the success of developing teamwork skills using artificial teams in experimental settings in the military sector.

Finally, ‘LeadSim’ is based on critical incidents that are non-trivial to develop and require expertise beyond simple problem-solving competence (HORNETT & LEE,

2017; ALISON et al., 2013). Developers should be able to select relevant sequences of critical incidents, systematically design available options as they would be expected in reality, and consider all possible scenarios to determine how the business or team situation should realistically develop based on certain decisions. This is one of the main barriers to and reasons for the relative scarcity of such simulations (MARTENS et al., 2008).

### **3.4 First tests of ‘LeadSim’ prototype**

Over the past few semesters, we have tested ‘LeadSim’ in a number of ways. First, we selected three high-performing students from the leadership course, and after they completed the simulation, generated individual 360° assessments based on their responses, priorities, and personality traits. Students found it valuable to reflect on their behaviour and self-perception.

Second, we evaluated the simulation responses of 27 students and received feedback from seven of them. Students found the tool realistic and mentioned that making decisions in critical situations requires significant deliberation.

Third, we facilitated guided classroom discussions about the episodes and encouraged collective reflection. The students appreciated realistic scenarios, although they sometimes found the development of interactions surprising. Overall, the pre-tests indicated high acceptance of the tool, a realistic design of the simulation model, and a positive impact on reflection processes.

From the didactic perspective we particularly emphasise the various application formats of ‘LeadSim’ in teaching, including individual use or guided group work. This tool is easily accessible and generates an interest in leadership. However, the effectiveness of the learning experience may vary depending on individual motivation and the ability to reflect on one’s actions, as well as the instructor’s competence in facilitating guided discussions.

## 4 Discussion and conclusion

Learning leadership extends beyond acquiring leadership-relevant knowledge and practical skills; it requires opportunities for reflection on both aspects (ROBERTSON, 2013). Consequently, contemporary didactics in higher education, including the field of leadership, should aim to design learning processes that generate recognisable and worthwhile learning opportunities for students.

Computer-based simulations and RPGs embrace the concept of experiential learning (KOLB, 1984; KRIZ & NÖBAUER, 2015), which involves active experimentation, concrete experience, reflective observation, and abstract conceptualisation. Simulations create virtual practice environments in which individuals can explore ideas, test assumptions, experiment with behaviours, and analyse the consequences of their actions without incurring costs, risks, or career setbacks (SUDA, 2017). Furthermore, simulation-based formats can be used to gamify complex cause-and-effect relationships, raise awareness of the interdependencies of economic decisions (WÜST & KUPPINGER, 2012), and transfer tacit practice-relevant knowledge that is not easily codified in traditional teaching settings.

With our new simulation, ‘LeadSim’, we specifically focus on developing leadership competence through individual learning and reflection processes guided by educators. We outline the underlying concept, highlight its pedagogical merits, and acknowledge its limitations, thus contributing to the discussion on university teaching methodologies and leadership education. Future research can examine the actual learning effects of ‘LeadSim’ and critically explore the extent to which the simulation facilitates the intended development of leadership skills. Additionally, investigating the impact of simulations on individual learning, motivation, and performance is another empirical aspect that needs to be addressed. This research would contribute to the broader discourse on leadership development, particularly in the context of leadership courses in higher education institutions.

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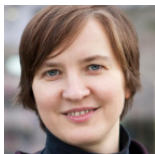
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