Developing Leadership Skills Through Simulation-Based Training: A Research Framework and Interpretive Case Study

Développer les compétences de leadership par la simulation : un cadre de recherche et une étude de cas interprétative

El desarrollo de habilidades de liderazgo a través de la formación basada en la simulación: Un marco de investigación y un estudio de caso interpretativo

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ABSTRACT
Despite a growing consensus regarding the significance of critical inquiry, reflective thinking and experimentation in driving much of leadership training, we still lack empirical evidence on how pragmatist approaches to learning (e.g. game-based learning, simulation-based training) actually support the development of leadership skills. In particular, little is known about the interplay between multiple factors (i.e., instructional features, trainees’ profile, socio-cultural norms) enabling simulation-based training, and how it affects the consolidation of heterogeneous types of leadership skills. To fill these gaps, this article establishes a conceptual framework based on three propositions, and assesses its validity through an interpretive case study.

Keywords: Leadership learning. Leadership skills. Simulation-Based Training

Résumé
Si l’importance de la pensée critique, de la réflexivité et de l’expérimentation en matière d’apprentissage du leadership fait consensus, nous manquons de preuves empiriques concernant la façon dont les processus d’apprentissage pragmatistes facilitent le développement des compétences de leadership. Nous savons peu de choses sur l’interaction entre les multiples facteurs favorables à l’apprentissage basé sur la simulation, ainsi que sur la façon dont cette interaction affecte la consolidation des compétences individuelles et relationnelles de leadership. Pour combler ces lacunes, cet article propose un cadre conceptuel basé sur trois propositions, et évalue sa validité à travers une étude de cas interprétative.

Mots-Clés : Apprentissage du leadership. Compétences du leadership. Techniques d’apprentissage basées sur la simulation

Resumen
Aunque hay consenso sobre la importancia del pensamiento crítico, la reflexividad y la experimentación en el aprendizaje del liderazgo, carecemos de pruebas empíricas sobre cómo los procesos de aprendizaje pragmático facilitan el desarrollo de las competencias de liderazgo. Se sabe poco sobre la interacción entre los múltiples factores que apoyan el aprendizaje basado en la simulación, y cómo esta interacción afecta al desarrollo de las competencias de liderazgo individuales y relacionales. Para abordar estas lagunas, este trabajo propone un marco conceptual basado en tres proposiciones, y evalúa su validez mediante un estudio de caso interpretativo.

Palabras Clave: Aprendizaje de leadership. Liderazgo. Habilidades de leadership. Técnicas de aprendizaje basadas en simulación

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Over the past three decades, a consensus has emerged among scholars that simulation-based training (SBT) and game-based learning (GBL) offer organizations useful methods and artefacts to design leadership development programs that promote various types of leadership skills and styles (Keys and Wolfe, 1990; Drew and Davidson, 1993; Smith, 2001; Bourdeau et al., 2020). Yet, Mumford et al. (2000a, p. 92) observed that “evidence bearing on the ability of these programs to develop requisite leadership skills is often less than compelling”. Despite extensive research since then, additional research is needed to improve our knowledge of how simulations and games “may influence the development of leadership skills” (Sousa and Rocha, 2019, p. 360).

It is contended in this contribution that scholars have been inconclusive essentially because many past and recent studies either treated SBT as if it relies on a universal learning process (Clarke and Higgs, 2016), or have focused their research endeavor on specific factors such as trainee expertise (Mumford et al., 2015) and SBT’s socio-material properties (Bourdeau et al., 2020), without examining how these factors jointly affect the development of leadership skills. This article, therefore, seeks to fill a gap in the literature by establishing a framework for characterizing the relationships between SBT’s features and processes, and assessing how these relationships affect the quality of trainees’ learning experiences and diversity of learning outcomes (i.e., leadership skills). Once established, this framework shall help us critically examine the conditions enabling simulation-based leadership training.

Three questions deserve particular attention: (1) Which cognitive processes are used by trainees involved in simulation-based leadership development? (2) Which leadership skills are developed through SBT? (3) Which SBT’s properties positively affect leadership development? Each question emphasizes a core dimension of simulation-based leadership development, namely cognitive processes (i.e., pragmatist learning processes; Rodgers, 2012); leadership skills’ heterogeneity (i.e., intrapersonal and interpersonal skills; Day, 2000); and SBT’s socio-material and instructional properties (Bourdeau et al., 2020). Although these questions have been extensively, often separately, discussed in the literature, little research has attempted to address them as complementary factors affecting simulation-based leadership learning. This contribution therefore aims to establish a framework articulating three dimensions that are usually treated in isolation by scholars, and explores how the interplay between SBT’s processes and features conditions the development of different types of leadership skills.

To assess the validity of our framework, an interpretive case study is developed (Thomas, 2010). The empirical material which has been collected to elaborate on the case study is given by the French Army Light Aviation’s Unit Commanders (FALA_UC) leadership program. Alike many studies of leadership development (Marshall-Mies et al., 2000; Mumford et al., 2000a&b), this contribution focuses its empirical investigation on a military case study. It is assumed that military leadership development practices can provide useful insights in order to explore the conditions for SBT to actually support leadership development. In particular, modern military organizations benefit from a long-standing tradition in leadership development and are familiar with simulation techniques for training their personnel, notwithstanding their level of expertise, professional background and technical expertise. In addition, military aerospace organizations’ cultural values can be characterized by a form of institutional tolerance to error and a professional background which enables people viewing failures as valuable sources of learning (Ron et al., 2006; Catino and Patriotta, 2013). Experimentation is thus encouraged to the extent that it contributes to improving flight safety and, beyond that, operational performance (Lipshitz et al., 2002). The foregoing is shaping any military personnel’s behavioral attitude and relational posture, whatever his or her role and functions, and drives much of military teamwork, from initial education and operational training, to actual warfare missions. As a result, the alternation between training and combat on the one hand, and the acquisition and consolidation of operational knowledge and skills on the other, is seen as something natural by military personnel. This ensures a seamless transfer of learning between virtual and instrumented simulation training and actual warfare, with simulated and actual practices complementing each other, without any breach of individual and collective learning cycles.

The rest of the article is organized as follows. It starts by reviewing the literature on education management, leadership development, and simulation-based training to establish a framework for querying how simulation-based training actually supports leadership development. Then, the case study’s methodology, data sources and analysis, and research context are introduced. Case study’s results are presented in the penultimate section. The final parts discuss the main contributions of this study for both scholars and managers.
Simulation-Based Leadership Development: A Research Framework

Despite their potential benefits in multiple operational, technical and social areas, many organizations are still reluctant to invest time, effort or money in offering simulation-based leadership development programs to their employees, mainly because the results are far from guaranteed (Stainton et al., 2010) and/or empirically established (Martin et al., 2021). Next sections aim to establish a framework for assessing the conditions for leadership development through SBT. The framework is based on three propositions which logically derive from the literature on leadership development and SBT. Taken together, these propositions help to identify which SBT’s features and properties actually shape people’s learning processes and promote the development of different types of leadership skills.

Pragmatist Learning Processes and Simulation-Based Leadership Development

SBT is conceptualized by Salas et al. (2009, p. 560) as “any synthetic practice environment that is created in order to impart competencies [...] that will improve a trainee’s performance. Simulation-based training is just one training approach that particularly focuses on providing trainees with the opportunities to develop and practice the required competencies and receive feedback.” Although Bell et al. (2008) reminded us that “games and simulations are terms that are used relatively interchangeably” (Bell et al., 2008, p. 6), it is customary to distinguish between three categories of SBT methods (Pollock et al., 2012): (1) Virtual simulations (i.e., individuals engaged in and interacting with an artificially reproduced realistic, imaginary and/or ludic work-based environment); (2) Instrumented (or Live) simulations (i.e., individuals placed in a real-world learning context, most often represented in the form of a game or a simulated exercise); (3) Constructive simulations (i.e., artificial worlds in which artificial agents interact with each other to perform tasks and solve problems, without direct human interventions).

In practice, SBT and gaming involve trainees who are mentally, physically and emotionally engaged in collective problem-solving activities that make sense to them (Kayes et al., 2005). Trainees are then capable of designing, planning, implementing and reflecting upon collective actions (Cho and Egan, 2009), while assessing one’s own and others’ actions, representations and mental models. From an epistemological point of view, scholars assumed that pragmatist approaches to learning such as SBT, can nurture a “systematic, rigorous, disciplined way of thinking” which creates meanings by enabling individuals to develop knowledge “in interaction with others” and through the establishment of “connections to other experiences and ideas” (Rogers, 2012, p. 845). The knowledge developed through SBT is experiential (and not just theoretical or symbolic) in the sense that it is revealed through the experiences of people placed in a position to act and reflect collectively on the causes and consequences of their own actions and those of others.

Three cognitive processes can thus be distinguished as the main drivers for simulation-based learning: (1) Experimentation; (2) Reflection; and (3) Inquiry. Experimentation can be defined as a problem-oriented activity that involves consciously designing and implementing sequences of actions (i.e., experiments) to test and evaluate hypotheses, relationships and outcomes, while paying attention to their conditional variability. In this view, inquiry contributes to experimental activity by supporting the discovery of causal relationships through systematic and rigorous observations. Inquiry-based experimentation therefore, makes individuals capable of “persisting in investigation until full understanding is achieved” (Lipshitz et al., 2002, p. 85), with understandability emerging through the inquirer’s reflective analysis of the causes and consequences of the experiment. Defined as “the process of creating meaning and clarifying the meaning of experience [present or past] in terms of self” (Boyd and Fales, 1983, p. 101), reflective thinking designates a feedback-driven and self-directed mental process consisting of “diagnosis, testing and belief in personal causation” (Smith, 2001, p. 32). Although experimentation, reflection and inquiry jointly support pragmatist learning, they are not based on substitutable cognitive mechanisms. Reflection and inquiry should be seen as meta-cognitive mechanisms used in concert to control (i.e., monitor, evaluate and regulate) experimentation and guide its outcomes. This distinction forms the basis of our first proposition.

Proposition 1: SBT is based on distinctive cognitive processes (experimentation, reflection, inquiry) which specifically affect leadership development.

Simulation-Based Learning and Leadership Skills

After reviewing almost five decades of research on leadership development, Day (2000) and Day et al. (2014) classified leadership competencies into two main categories: (1) intrapersonal competencies (i.e., “individual-based knowledge, skills, and abilities associated with formal leadership roles”; Day, 2000, p. 584); and
interpersonal competencies (i.e., “building networked relationships among individuals that enhance cooperation and resource exchange in creating organizational value”; Day, 2000, p. 585). Each category is made up with distinctive individual skills (i.e., self-awareness, self-regulation, and self-motivation; Day, 2000, p. 584) and social abilities (i.e., social awareness and social skills; Day, 2000, p. 586). Although personal and relational leadership competencies are conceptually separable, they are fully integrated in actual organizational settings as a “collective capacity of organizational members to engage effectively in leadership roles and processes” (Day, 2000, p. 582). In this view, leadership development “involves a complex interaction between people and their social and organizational environments” (Day et al., 2014, pp. 65–66), the latter being uncertain and potentially unpredictable. Shoemaker et al. (2013) suggested that leaders can be distinguished precisely by their ability “to think strategically and navigate the unknown effectively” (Shoemaker al., 2013, p. 2). Adopting a strategic lens, the authors identified six types of skills (i.e., “to anticipate, challenge, interpret, decide, align and learn”; Shoemaker et al. 2013, p. 2) that are used in combination by leaders when confronting uncertainty. According to Mumford et al. (2000a&b), a person’s ability to frame and solve complex, often ill-defined, problems (e.g., through social judgement and creative thinking), objectively reflect her level of expertise as a leader. Table 1 provides a synthetic view of the above typologies of leadership competencies and associated skills.

From Table 1, it is assumed that leadership development involves a variety of human-centered behavioral, psychological and emotional traits (intrapersonal skills), as well as relational and social abilities in problem-solving and strategic thinking (interpersonal skills). The foregoing assumption forms the basis of our second proposition.

**Proposition 2:** SBT enables the development of distinctive categories of (intrapersonal and interpersonal) leadership skills.

### Learning Experiences and SBT’s Features

Education management research has shown that SBT’s instructional features and physical properties “can positively affect students’ engagement levels and learning processes” (Bourdeau et al., 2020, p. 89), therefore shaping the quality of both individual and collective learning experiences. Specifically, scholars stressed the importance of aligning the psycho-cognitive profile of the learners, including their level of expertise and motivation, with the complexity of the SBT technique’s learning tasks and socio-material properties (Mumford et al., 2000a&b; Salas et al. 2012). The quality of a person’s learning experience (i.e., involvement and presence; Bouvier et al., 2014) is indeed very sensitive to the functional properties (i.e., ergonomics, sensorimotor qualities) of the simulation interfaces (virtual simulations) on the one hand, and the semantic, symbolic and emotional content of the simulated content on the other (Salas and Cannon-Bowers, 1997). Regarding functional properties, it has been shown that the degree of fidelity of the simulated environment has a positive impact on learners’ experience. For example, certain virtual interfaces can favor individuals’ “sensory immersion” (Dede, 2009, p. 66) through the reproduction of the sensations they would experience in real world environments (e.g., stereoscopic sound, realism of forces and vibrations, fidelity of movements and touch, etc.). The use of such devices makes it possible to virtually reproduce the psychomotor sensations felt by an individual in his or her natural environment, thus tending to improve the intensity of learning. Regarding simulated contents, contextualization (i.e., the scripting of learning situations) has a positive influence on the accumulation of experience. The symbolic richness of simulations promotes learners’ emotional

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**TABLE 1**

A typology of leadership competencies

<table>
<thead>
<tr>
<th>Leadership competencies</th>
<th>Leadership skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-awareness</td>
<td>Emotional awareness, Self-confidence, Accurate self-image, Humility, Reflexivity</td>
</tr>
<tr>
<td>Self-regulation</td>
<td>Self-control, Trustworthiness, Personal responsibility, Consciousness, Adaptability, Self-transformation</td>
</tr>
<tr>
<td>Self-motivation</td>
<td>Initiative, Commitment, Optimism</td>
</tr>
<tr>
<td>Problem-solving</td>
<td>Creative thinking, Planning and implementation, Solution construction and evaluation, Social judgment, Meta-cognitive processes, Sense-making</td>
</tr>
<tr>
<td>Strategy</td>
<td>Strategy implementation, alignment, commitment, consensus &amp; sharing, Decision-making, Anticipation, Challenging &amp; Learning</td>
</tr>
<tr>
<td>Social awareness</td>
<td>Empathy, Service orientation, Political awareness</td>
</tr>
<tr>
<td>Relational</td>
<td>Building bonds, Team orientation, Team building, Dialogue, Change catalyst, Conflict management, Communication</td>
</tr>
</tbody>
</table>

Source: Adapted from Day, 2000; Mumford et al. 2000a&b; Shoemaker et al.
engagement, therefore creating the conditions for a rich learning experience by soliciting representations, beliefs and values that would be triggered in real settings (Engström et al., 2016). In this view, organizational learning scholars have shown how certain socio-cultural variables are likely to shape individuals’ emotions and, by extension, have an influence on their ability to interact (Joo, 2012) and learn (Zhao, 2011). Catino and Patriotta (2013, p. 438) evoked the notion of a “safety culture” to define “a fundamental sense making resource that guides members’ interpretations in the face of problematic situations” (Catino and Patriotta, 2013, p. 442). Their idea is that a safety culture is based on a common set of norms and values which encourage dialogue, interpersonal trust and sharing of experiences, and contribute to the establishment of a safe psychological and emotional climate conducive to valuable learning. Table 2 provides a synthetic view of SBT’s socio-material, functional, semantic, symbolic and instructional features affecting trainees’ learning experiences.

The foregoing discussion of the literature suggests that SBT techniques’ physical and instructional features, as well as the socio-cultural values and norms characterizing simulation-based learning environments, can (positively or negatively) affect the quality and intensity of trainees’ learning experiences. The third proposition which completes our framework can be formulated as follows:

Proposition 3: SBT’s instructional features and socio-material properties shape the quality of trainees’ learning experiences and outcomes.

Next sections critically examined the above assumption through a case study.

**Methodology**

The methodology adopted in this contribution takes inspiration from Thomas’s (2010) perspective on abduction. The latter fits well with case study research in social science for which conceptual categories exist but are not fully articulated so as to constitute a theory. In this view, our case study aims at delivering “exemplary knowledge unselfconsciously based on abduction” (Thomas, 2010, p. 576) without attempting at any generalization or theorization as inductive approaches would suggest. Validation essentially comes from knowledge comprehensibility and intelligibility (“understandability,” Thomas, 2010, p. 579), the latter resulting from the interplay between people’s thoughts, beliefs, motives, choices and agency on the one hand, and those of the inquirer, including her mental categories, interpretive patterns, and conceptual assumptions, on the other. The recursive relationships between researcher’s observations and mental models, and between the latter and the objects (and subjects) of her observations, are thus constitutive of the validation process.

**Data Sources and Analysis**

The French Army Light Aviation Unit Commander’s (FALA-UC) leadership program is a four months-long program dedicated to experienced officers with two to three years-long experience as squadron-units’ deputy commanders. Whatever their professional and technical background, all Army aviation’s officers have to follow the program. The latter encompasses three phases: the first phase (from January to February) is dedicated to the acquisition of basic leadership knowledge through traditional lectures; the second and third phases are focused on the consolidation of trainees’ previously acquired knowledge through two SBT exercises: the first one is organized in March and involves a combination of virtual, instrumented and constructive simulation techniques; the second one is based on a real military exercise and takes place at the end of April.

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**TABLE 2**

<table>
<thead>
<tr>
<th>SBT enabling properties</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructional and physical features</td>
<td>Physical, functional, symbolic, and semantic features of SBT techniques (e.g., task complexity, problem-structures, scripts, scenarios, simulations’ fidelity)</td>
</tr>
<tr>
<td>Trainees’ profile</td>
<td>Trainees’ psycho-cognitive attitudinal profile, including mental and emotional states (e.g., motivation, engagement, involvement, presence) and professional experience (e.g., qualifications, expertise)</td>
</tr>
<tr>
<td>Socio-cultural features</td>
<td>Cultural values and norms that characterize trainees’ learning environment (e.g., safety, interpersonal trust, dialogue, knowledge sharing)</td>
</tr>
</tbody>
</table>
Our empirical investigation is focused on the first SBT exercise which lasted two days. Twelve trainees (all males) with similar ranks and expertise participated in the exercise. They were all Captain-ranked (31 years old on average) and Patrol Leader’s qualified (i.e., NATO qualification level).

Two methods of primary data collection have been applied to document the case: (1) non-participant observations and (2) interviews. The first source of data comes from the author’s non-participant observation of the simulation exercise (March 2017). Observations enabled the writing of a field book in which the goals of the training session, its structure, the artefacts used by the trainees to perform tasks, the role structure assigned to each, and the scripting content of each sequence of the exercise, have been recorded. Personal interpretations of the observed situations, including those associated with trainees’ emotional state, have been quoted too. Finally, the technical, semantic and symbolic properties of the interfaces and, more broadly, of the SBT system used by trainees, have been documented and validated through direct exchanges with instructors and monitors.

The second source of data is based on interviews relying on formal (semi-structured interviews) and informal discussions with the group of trainees, plus the evaluators (i.e., senior officers) who also participated in the simulation exercise as members of the command and control (C²) staff (see, Table 3).

A two-part interview guideline was used to frame the exchanges with trainees and evaluators. The first part concerned the objectives, advantages and disadvantages of SBT. It was conducted informally with the group of trainees at the end of the first day. Its duration was 75 minutes. The second part was focusing on the (un)favorable factors enabling (limiting) learning. Its duration was 45 minutes and occurred at the end of the second day.

The above primary data sources have been supplemented by informal discussions with a senior officer who attended the FALA_UC program in 2020. These conversations took place in April 2021 with the aim of clarifying some observations made during the exercise regarding selection and evaluation processes, and trainees’ (high) level of engagement.

The primary data corpus thus constituted was manually processed through open coding. Data analysis proceeded through memoing, daily reflections and interpretations, and critical thinking and validation. The foregoing enabled the identification of twenty-three 1st order concepts, the latter being organized into five 2nd order themes. The resulting data structure allowed us to characterize the SBT technique’s socio-material properties used during the exercise, and identify those which may have an influence on trainees’ learning practices and outcomes (see, Table 4).

### Research Context

#### Unit Commanders’ Leadership Skills.

In the French Army Light Aviation (FALA), unit commanders are responsible for the deployment and coordination of two to three patrols, each consisting of two to three aircraft. The FALA unit commander’s associated NATO qualification level is called Mission Commander (MC). It corresponds to middle-ranked officers interfacing field units responsible for carrying out the mission on the one hand, and command and control (C²) senior officers in charge of planning and controlling military operations on the other. The main role of a unit commander is therefore to translate the command intent into initial orders to his patrol leaders, to brief the team and plan the mission, to direct the operations at the tactical level and to organize the collective debriefing once the mission is over. Building on the Army Aviation’s officers’ evaluation guidelines, five categories of intrapersonal leadership competencies, and two categories of
interpersonal leadership competencies have been documented. Each category was decomposed into different types of individual and relational leadership skills, which are currently used by senior officers to evaluate trainees’ mastering of leadership competencies during the exercise. Table 5 provides a synthetic presentation of the above categories of leadership competencies and skills.

**Characteristics of the Virtual Simulation-Based Technique Used by the Army Light Aviation**

The SBT technique used by the Army aviation to enable trainees consolidating their leadership skills is called EDITH (Entraîneur Didactique Interactif Tactique Hélicoptère). It is a distributed SBT system consisting of six workstations connected in a network, which delivers virtual, instrumented and constructive capabilities. Each workstation reproduces the cockpit as well as the instruments of any type of Army aviation’s aircraft on three computer screens. The workstation is configured to accommodate two persons facing a 180° screen that virtually reproduces a three-dimensional (3D) natural environment. A simulation control station is placed at the rear of the cockpit, facing the screen representing the 3D environment. This station is fielded by some personnel in charge of the follow-up of the simulation (monitor) or any other individual involved in the conduct of the mission or in the unfolding of the scenario. People on the workstations can interact physically and communicate through the radio. Interactions between participants can also occur within the shared virtual environment (3D mapping), and communications between different workstations are enabled by the radio. By replicating Army aviation’s action and interaction registers (including techniques, tactics, procedures, and rules of engagement) EDITH provides trainees with the opportunity to engage with meaningful problems in a complex socio-material environment, therefore creating the conditions for a realistic warfare experience.
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### Structure of the SBT Activity

The training activity is broken down into three sequences [i.e., Planning, Action, Debriefing], each being made up with different training tasks. The planning sequence includes four tasks: General briefing, Mission preparation, Conclusion of the analysis, and Presentation of the initial order. The Action sequence consists in the collective realization of the simulated mission (EDITH), and is made up with one single task, namely the Conduct of the mission. The Debriefing sequence is based on the last task called After-Action-Analysis (AAA). Table 6 provides a synthetic view of the structure of the exercise.

<table>
<thead>
<tr>
<th>Training sequences</th>
<th>Training tasks</th>
<th>Main goal</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>#1 Planning</strong></td>
<td>#1 General briefing</td>
<td>Presentation of mission’s goals and command intent. Duration: 45 minutes</td>
</tr>
<tr>
<td></td>
<td>#2 Preparation of the mission</td>
<td>Planning for a complex military operation. Duration: 4 hours</td>
</tr>
<tr>
<td></td>
<td>#3 Conclusion of the analysis</td>
<td>Articulation of the command intent and negotiation for critical resources. Duration: 1 hour</td>
</tr>
<tr>
<td></td>
<td>#4 Presentation of the initial order</td>
<td>Translation of the command intent into tactical maneuver. Duration: 45 minutes</td>
</tr>
<tr>
<td><strong>#2 Action</strong></td>
<td>#5 Conduct of the mission</td>
<td>Implementation of the initial order and realization of the mission. Duration: 2 hours</td>
</tr>
<tr>
<td><strong>#3 Debriefing</strong></td>
<td>#6 After Action Analysis</td>
<td>Reflective analysis and identification of lessons learned. Duration: 4 hours</td>
</tr>
</tbody>
</table>

### French Army Aviation program’s leadership competencies and skills

<table>
<thead>
<tr>
<th>Leadership competences</th>
<th>Leadership skills</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intrapersonal</strong></td>
<td></td>
</tr>
<tr>
<td>Analysis</td>
<td>- Quick-wittedness (“quick understanding of the issues, a situation, and vision relevant to medium or long term”)</td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sharing/conviction</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Team spirit, Cohesion, Exemplarity, Conviction (“to transmit ideas and knowledge”)</td>
</tr>
<tr>
<td><strong>Achievement/performance</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Initiative and Perseverance (“in order to achieve the objectives set”)</td>
</tr>
<tr>
<td><strong>Personality</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Self-control, Self-confidence, Team spirit, Honesty, Soberness, Sense of responsibilities, Initiative, Judgement</td>
</tr>
<tr>
<td></td>
<td>- Authority, Relational skills, Self-awareness, Open-mindedness, Creativity, Listening skills, Anticipation</td>
</tr>
<tr>
<td><strong>Interpersonal</strong></td>
<td></td>
</tr>
<tr>
<td>Decision-making</td>
<td>- Rigor, Sense of responsibilities (“Exposing oneself to choices made with rigor; sticking to them and assuming them with the sense of responsibilities”)</td>
</tr>
<tr>
<td></td>
<td>- Risk-taking (“by having measured the impact and consequences”)</td>
</tr>
<tr>
<td>Supervision/management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Organization (“Organize and lead”).</td>
</tr>
<tr>
<td></td>
<td>- Pragmatism (“Objectivity Identify the objectives of collaborators with realism and objectivity”).</td>
</tr>
<tr>
<td></td>
<td>- Delegation (“Delegate, entrust the appropriate missions and control”)</td>
</tr>
<tr>
<td></td>
<td>- Team building &amp; development (“Develop the skills of employees”)</td>
</tr>
<tr>
<td><strong>Animation</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Motivation (“Motivate, train, instill a dynamic of group”)</td>
</tr>
<tr>
<td></td>
<td>- Judgement &amp; Conflict management (“Use good judgment and diplomacy in conflict situations”)</td>
</tr>
<tr>
<td></td>
<td>- Negotiation &amp; Relational management (“Knowing how to network and negotiate”)</td>
</tr>
</tbody>
</table>

**Sources:** FALA commissioned and non-commissioned officers’ evaluation guidelines
Results
The presentation of the results is organized as follows. We build on the decomposition of the training session to explore how trainees learn to consolidate leadership skills when achieving the various tasks which make up the different training sequences. Each task is first described and analyzed separately (i.e., interpretative analysis), with the comprehensibility and intelligibility of the propositions that make up our framework being assessed for each sequence (i.e., validation process).

Interpretive Analysis
Task #1: General Briefing
The planning sequence begins with a general briefing of the exercise to all participants. The objectives of the operation are presented by senior officers, as well as the constraints of the operation (including all socio-political, geographical, cultural and military aspects). The General briefing takes place in a large room, in front of a map representing the area of operations. Each trainee already knows his role and duties during the exercise. One trainee (i.e., the unit commander) is responsible for the planning, conduct and debriefing of the operation. The other trainees play different roles within the group (e.g., wingman, patrol leader, ground intelligence officer, etc.). The exercise scenario is built on realistic political, operational and tactical assumptions, inspired by real operational situations.

The General briefing is based on a formal procedure, which consists of the trainees gathering, classifying and integrating heterogeneous pieces of information. The command intent is formulated by senior officers and trainees are free to intervene and ask questions, but interactions must respect a procedure. This procedure is aligned with NATO standards in which the various key points of the mission are addressed in a particular, predefined order (i.e., Navigation, radio transmissions, and role structures within the airborne group, code words and Non-Compliant Cases). Once the general briefing is complete, the unit commander, surrounded by patrol leaders, skippers and wingers, prepares the mission.

Task #2: Mission Preparation
The goal of the Mission preparation task is to evaluate trainees’ capacity to plan a complex operation, including specifying navigation parameters, supply zones, mission constraints and capabilities. Trainees begin the preparation task by taking care to arrange the physical space in which they have to interact. The room dedicated to this training task is equipped with three offices, a dozen chairs and two white boards. The trainees then start by grouping offices in the center of the room, the chairs being relegated along the walls. Participants take place around the tables, with the unit commander occupying the central space. The unit commander then assigns work packages to patrol leaders. Work packages’ assignment proceeds as follows: a duo works on the Milieu (i.e., location and field study), another on Friends (i.e., location, mission, navigation, ammunition and capabilities etc.), and the last one on Enemies (i.e., location threats, tactics, ammunition, behavior, etc.). All doctrinal and tactical documentations are accessible during the preparation of the mission. These are placed on the tables and consulted regularly by the participants. Communication operates through direct interpersonal exchanges, and is mediated and supported by several technical resources and artefacts (e.g., geographical maps, doctrine documents, tactics, techniques and procedures).

Standing in the center of the room with the geographical map in front of him, the unit commander orchestrates the ballet of “duos” by words, providing rhythm for the achievement of the preparation task. As noted in the field book, his body posture and tone of voice are indicators of the high level of tension and concentration that can be felt in the room. During the interview, the trainees were asked to react to the extreme concentration observed during the preparation of the mission. One captain said: “We fight as we train. We are educated like that. The success of the mission is first and foremost the preparation. If we work well during the preparation, we will be able to cope with operational circumstances.”

By focusing the team’s efforts and attention on issues of mission coordination, timing, tactics and maneuvers, the unit commander encourages subordinates to take initiative and experiment with creative solutions to tactical problems. Collaboration is therefore particularly solicited during the preparation task. This point is confirmed by one captain: “It’s in our DNA. The unit commander cannot prepare the mission alone. He must rely on others”. In the words of the trainee playing the role of the unit commander: “My job is to find the right mix between my legitimacy as unit commander and the obligation to delegate part of my authority. The unit commander makes decisions but it is always the result of a collective work where others’ expertise has its full place”.

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On several occasions, the exchanges between the trainees refer to their previous operational experiences enabling them to establish a common context on which consensus can be based within the team. This facilitates the alignment of tactical actions with strategic objectives, the former being bounded by the semantic and symbolic properties of the mission scenario, and creates the conditions for inter-individual commitment and initiative to develop.

**Task #3: Conclusion of the Analysis**

The presentation of the Conclusions of the analysis consists in expressing requests for human, information and material resources to senior officers. The unit commander has to justify his choices to the command staff. Each request is debated by the commanders and has to be argued. It can be granted or refused. The unit commander has to obtain senior leaders’ approval and access the needed assets to conduct the mission. He is primarily evaluated on his ability to elicit command support and convince his superiors of the relevance of his tactical analysis, planned actions and associated needs.

When carrying out the Conclusions of the analysis, interpersonal relations change in nature and become more formal, with the unit commander no longer interacting with his team members but with the senior officers composing the command and control staff (C²). This gives the unit commander an opportunity to demonstrate understanding of the command intent, to explain the maneuver and to specify his equipment, information and personnel requirements. The ability of the unit commander to negotiate for military resources is critically evaluated by senior leaders. At the same time, he is asked to demonstrate his political awareness of the strategic implications of his tactical maneuver. One instructor said: “We push him [the unit commander, added by the author] to the limits. It is an intellectual challenge. A unit commander must be capable of convincing us and, above all, his Patrol Leaders that he gets the right analysis. And he must be capable of sharing it with all.”

**Task #4: Presentation of the Initial Order**

After presenting his Conclusions of the analysis, the unit commander proceeds to the Presentation of the initial order and transmits his own translation of the command intent to the patrol leaders. Each trainee learns about his role, capacities, constraints, and objectives during the mission. The Presentation of the initial order follows a precise outline. It starts with the synthetic presentation of the Mission, Enemies and Friends, and continues on with the division of the operation into temporal sequences, the allocation of tasks between patrols, and the validation of navigation elements (e.g., itineraries, waiting zones, refueling areas, etc.). Additional issues concern coordination instructions (e.g., regrouping points, fire zone, etc.), data links and communication frequencies, and actions to be taken against the enemy. The presentation of the initial order ends up with the discussion of tactical non-compliant cases and weather conditions.

Surprisingly, when the initial order presentation was completed, trainees did not follow instructors and monitors for the lunch break. Their choice was to stay on the spot. This collegial decision not to have lunch at the school restaurant was surprising. When asked about this during the collective interview, trainees indicated that the objective was to “reproduce the living conditions” that prevail in real operations. This collective decision suggests that trainees get fully involved in the training activity.

**Task #5: Conduct of the Mission**

After the planning sequence-related tasks are complete, trainees implement the initial order and “play” the mission on EDITH. Each patrol, including the unit commander, takes place at the controls of a dedicated workstation (i.e., low-fidelity cockpits). Trainees playing the role of ground intelligence and air traffic controllers take place at the rear of the workstations. The commanders in charge of operations (CO) are located in another room. They work on paper maps to monitor the evolution of operations and communicate thanks to the radio. All personnel operate within the same virtual environment (except CO) and interact thanks to the radio communication system.

The goal of this task is to create the conditions for the trainees to experiment with the plan they have collectively developed. Trainees can interact both physically through radio communications, visual contacts and body language (i.e., physical proximity enables direct contact among trainees within each workstation), and virtually through EDITH’s 3D simulated environment (e.g., aircraft can “cross each other” within virtual landscapes). The Conduct of the mission is done in real time. One of the trainees said: “EDITH allows us to evolve deeply in a complex environment. Of course, the system does not reproduce the sensations of the real flight (…) this is not the goal. But it is a good tool that allows getting closer to the reality of the conduct of an operation”.

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Although the low fidelity of the cockpits contrasts with the semantic and symbolic richness of the simulated scenario, the trainees did not verbalize a break in attention during the execution of the mission on EDITH. One captain explained: "I do not make differences. Mentally and physically, I am at 100% [...] and then our leaders constantly remind us of the goals of the exercise."

In this context, the emotional experience of trainees is not related to the physical risks involved, but rather to the alignment of the functional and instructional properties of EDITH, including the realism of the mission, the time pressure associated with the training activity and the formal character of the exercise. Again, the quality of the trainees’ learning experience is highly dependent on their operational expertise. One instructor explains: “People get involved because they fully understand the mission that they are playing on [...] they can use things they have experienced during previous exercises or operations”.

Although the actions have been carefully planned, the senior officers responsible for assessing the trainees regularly intervene by providing new information or changing the conditions of the tactical environment [e.g. by changing the weather conditions]. Trainees are thus encouraged to adapt to changing conditions by designing and implementing appropriate actions that respond to changes in the tactical situation. These interventions add tension and uncertainty which, in turn, create additional conditions for experimentation. As the unit commander explains at the end of the first day: “I do not say that we are as tense as in OPEX [Expeditionary Operations, added by the author] but there is some stress and pressure.”

Communication is essential for the trainees to adapt to changing conditions, to coordinate actions and to make sense of the evolving tactical situation. One of the instructors emphasizes the importance of communication when conducting the mission: “Radio discipline is fundamental [...] you may have noticed it: a lot of our ability to understand the tactical situation depends on our ability to control communications”. As quoted in the field book, communications between trainees are very dense during the Conduct of the mission.

**Task #6: After-Action-Analysis**

After the mission has been accomplished on EDITH, trainees are invited to proceed to the “After Action Analysis” (AAA). This collective debriefing is organized during the second day of the exercise. The AAA is decomposed into four steps: [1] recalling mission’s goals; [2] analysis of mission’s progress, key events, decisions taken and results achieved; [3] identification of lessons learned and their implications for each trainee [including the unit commander under evaluation]; and [4] evaluation and implementation of lessons learned. During that stage, the mission is “re-played” transparently, including radio communications, thanks to the Mission Restitution System (MRS). The evolution of the tactical situation is projected on a wall-screen, the instructors stopping the film of operations in order to make trainees react to certain events.

The main objective of the AAA task is to get the unit commander and his team members to take a critical look at their decisions and actions in relation to their interpretation of the overall course of the mission. The trainees’ ability to make sense of the situation is thus critically assessed. Together with the unit commander, each trainee is invited to verbalize his perception of his role and functions. One instructor explains: “We prefer someone who asks himself the right questions and adapts his conduct than someone who thinks only the best way to apply the procedures [...] a unit commander must be capable of mobilizing expertise, taking a step back and adapting to the ever-changing conditions of the mission.”

More particularly, trainees are confronted with certain cognitive dissonances relating to differences in perception between memorized situations and restituted situations. These dissonances associated with minor deviations between individual perceptions and the realities of the tactical situation [i.e., weak signals] are difficult to verbalize. However, listening to radio exchanges between the unit commander and his patrol leaders, and between the unit commander and the staff, reveals contextual and communicational ambiguities which, in turn, offer trainees opportunities to learn. The latter are discovered and seized thanks to the transparency of the MRS and to the high level of trust which characterizes interpersonal relationships. Even if the debriefing session increases trainees’ anxiety and stress, especially for the unit commander whose least actions and decisions are decrypted, analyzed and discussed by his peers, the temptation to hide certain events carrying negative emotions is very limited. The feeling of safety is strong enough among trainees since they know that any potential error will not be sanctioned as soon as it provides an opportunity for improving flight safety and/or tactical efficiency. In the words of the senior officer: “It is precisely the quality of EDITH to put people in complex technical and human situations [...] we create the conditions for people to make mistakes and learn from them.”
Together with the MRS, cartographic resources play a critical role during the AAA task. In particular, the geographical map offers a space of intermediation which facilitates the construction of a shared understanding of the situation and enables the evaluation of actions’ causes and consequences. The movements through time and space of the patrols, friends and enemies are codified on the map where they take shape materially. As quoted in the field book, trainees physically converge towards the map and interact through it, confronting their perceptions and interpretations of the evolution of the tactical situation.

**Validation Process**

**Planning Sequence**

The different tasks that make up the planning sequence of the simulated exercise, while contributing in concert to its contextualization and appropriation by the participants, can be distinguished by the particular features of the SBT technique used by trainees to carry it out, and by their influence on the cognitive processes which actually support its implementation. As an illustration, the decision made by the trainees to rearrange the physical space dedicated to the preparation of the mission (i.e., SBT’s physical features), had a direct impact on their ability to use meta-cognitive processes such as reflective dialogue and inquiry, to consciously design and plan the mission. Similarly, the choice made by the trainees to stay on the spot for lunch after completing the preparation of the initial order, has extended the perimeter of socialization among them, and improved the conditions for experimentation to produce valuable outcomes. Other features, such as trainees’ profile (i.e., comparable expertise, qualification, and professional experience) and SBT’s instructional properties (e.g., role assignments), enabled experimentation within several, if not all, planning tasks. Altogether, the foregoing provides evidence for the validity of Proposition 1 and Proposition 3 with respect to the intelligibility of the training tasks of the planning sequence.

Also in relation to Proposition 1, although experimentation, reflection and inquiry were used by the trainees during the planning sequence, additional cognitive processes were implemented. It was thus observed that pragmatic learning processes were subtly complemented by three cognitive processes: information gathering and integration (General briefing), ideation (Mission preparation) and translation (Preparation of the initial order). In this respect, the processes of information gathering and integration supported experimentation and inquiry, and enabled the trainees to construct a mental representation of the operational context that gave meaning to its political, strategic and tactical dimensions. Ideation supported the creative initiative of the trainees in designing and formulating solutions to the multiple problems that arise during the preparation of the mission. Translation allowed for a common understanding and alignment of strategic, operational and tactical objectives among the trainees, and improved coordination and communication when transforming command intent into initial orders. The validity of Proposition 1 within the context of the planning sequence is thus positively assessed, but the perimeter of cognitive processes affecting leadership development is enlarged.

With regard to Proposition 2, the particular combination of meta-cognition (i.e., reflection and inquiry) and cognition (i.e., experimentation, information gathering and integration, ideation, and translation), enabled the development of different types of leadership skills. More specifically, certain skills were consolidated when trainees performed specific task(s); others were developed transversally during the entire Planning sequence. As an illustration, we observed that political awareness was particularly strengthened when the trainees were carrying out the General briefing and the Conclusions of the analysis, while sense-making was consolidated during each task of the planning sequence. More generally, relational competencies were merely consolidated during preparation tasks, while problem-solving and strategy-related leadership competencies were developed progressively throughout the planning sequence. Self-regulation competencies and self-awareness competencies finally, were primarily consolidated when the trainees were preparing the mission and negotiating the resources to carry it out. The surface of trainees’ consolidated individual and relational skills finally covered all categories of intrapersonal and interpersonal competencies [see, Table 2], and almost all types of leadership skills associated with these categories. Accordingly, we consider Proposition 2 to be valid for understanding the entire planning sequence.

For sake of clarity, Table 7 provides a detailed description of the leadership skills that have been consolidated when trainees performed the various training tasks associated with the planning sequence. It also gives a synthetic view of the cognitive processes used by trainees during the planning part of the exercise, and of the SBT’s features and properties enabling their implementation.
TABLE 7
Planning sequence

<table>
<thead>
<tr>
<th>Planning tasks</th>
<th>Cognitive processes</th>
<th>Simulation-based training features</th>
<th>Leadership skills [competencies]</th>
</tr>
</thead>
<tbody>
<tr>
<td>General briefing</td>
<td>- Information gathering</td>
<td>- Semantic and symbolic (script)</td>
<td>- Sense-making [problem-solving]</td>
</tr>
<tr>
<td></td>
<td>- Information integration</td>
<td>- Formal communication</td>
<td>- Strategy consensus and sharing [strategy]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Standard procedures</td>
<td>- Political awareness [social awareness]</td>
</tr>
<tr>
<td>Mission preparation</td>
<td>- Experimentation</td>
<td>- Role assignments</td>
<td>- Team orientation, team building, dialogue, conflict management, communication [relational]</td>
</tr>
<tr>
<td></td>
<td>- Inquiry</td>
<td>- Goal-settings</td>
<td>- Strategy implementation, alignment, commitment, consensus and sharing [strategy]</td>
</tr>
<tr>
<td></td>
<td>- Reflective dialogue</td>
<td>- Trainees’ profile [expertise]</td>
<td>- Creative thinking, planning, construction and evaluation of solutions, social judgement, sense-making [problem-solving]</td>
</tr>
<tr>
<td></td>
<td>- Ideation</td>
<td>- Physical</td>
<td>- Adaptability, self-control [self-regulation]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Instructional</td>
<td>- Humility, reflexivity [self-awareness]</td>
</tr>
<tr>
<td>Conclusions of the analysis</td>
<td>- Experimentation</td>
<td>- Role assignments</td>
<td>- Empathy [social awareness]</td>
</tr>
<tr>
<td></td>
<td>- Inquiry</td>
<td>- Communication [formal]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Dialogue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparation of the initial order</td>
<td>- Experimentation</td>
<td>- Role assignments</td>
<td>- Evaluation of solutions, sense-making [problem-solving]</td>
</tr>
<tr>
<td></td>
<td>- Inquiry</td>
<td>- Communication [formal]</td>
<td>- Challenging [strategy]</td>
</tr>
<tr>
<td></td>
<td>- Translation</td>
<td></td>
<td>- Emotional awareness, self-confidence, humility [self-awareness]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Self-control, personal responsibility [self-regulation]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Political awareness [social awareness]</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>

Action Sequence

The interpretative analysis of the Action sequence has shown that the functional and instructional features of EDITH played a key role in providing trainees with a rich and realistic warfare experience. In particular, the fine balance between the richness and realism of the mission script and the low fidelity of the piloting devices allowed the trainees to focus their efforts and attention on the real objectives of the training sequence, namely to effectively command and control the operation at the tactical level and to carry out the missions as collectively designed and planned. The resulting alignment of the instructional and functional properties of the SBT thus fostered trainees’ engagement and participation, and laid the foundation for a learning experience that proved emotionally conductive to immersion. The development of a truly immersive learning experience was further enhanced by the high degree of similarity and complementarity of the trainees’ profiles. The combination of similar individual expertise and shared operational experiences fostered inter-individual collaboration, and facilitated the sharing of mental models and situational knowledge patterns. Within this framework, experimentation was used by the trainees as the main cognitive process for developing experiential knowledge and consolidating leadership skills. Furthermore, reflection, rather than inquiry, was favored by the trainees to monitor, in real time, individual and collective actions and their effects, and to make sense of unpredictable changes affecting the tactical situation (e.g. uncertainty introduced by senior officers). The above shows that distinct cognitive processes were shaped by the SBT’s instructional features and functional properties (Proposition 3) and in turn influenced the way in which trainees consolidated their knowledge and skills (Proposition 1).

With regard to Proposition 2, there is evidence that the conduct of the mission through EDITH resulted in the development of distinct categories of leadership skills and intrapersonal and interpersonal competencies. In particular, the Action sequence confronted the trainees with problem solving and decision making issues under conditions of time pressure, emotional commitment and stress. These conditions led trainees to opt for reflection as the main (self-directed) metacognitive control mechanism over experimentation. As a result, the main intrapersonal competencies to be consolidated were self-regulation and self-awareness; and the preferred interpersonal competencies to be developed were mainly problem solving and strategy. Relational skills, social awareness and self-motivation were certainly consolidated during this particular sequence.
of the simulation training exercise, but only marginally. Table 8 provides a synthetic description of the leadership skills that have been consolidated when trainees performed the Action sequence. It also gives a view of the cognitive processes used by trainees, and associated enabling SBT’s features and properties.

**Debriefing Sequence**

When performing the AAA task, trainees relied mainly on reflection and critical enquiry into the causes and consequences of actions planned and carried out individually and collectively. Debriefing was particularly facilitated by the combined effect of specific features of SBT, mainly functional (e.g. MRS), instructional (e.g. goal setting) and socio-cultural (e.g., lessons learned cultural values). Overall, the alignment of these features created the conditions for leadership development to take place through reflection and inquiry. In particular, the trainees were able to make individual and collective sense of the tactical situation through verbalization and analysis, the latter supported by functional features such as viewing and listening to radio communications (MRS), and mapping artefacts. By promoting transparency and interpersonal trust, the features offered by the technical artefacts of SBT furthermore provided trainees with a safe learning environment (e.g. psychological and emotional comfort resulting from the consonance between organizational and individual learning values) which, in turn, affected the outcomes of the learning sequence. As an illustration, the subtle balance between transparency and interpersonal trust led the trainees to consolidate self-awareness and self-regulation competencies related to their respective roles and functions as leaders, including reflexivity, emotional awareness and accurate self-image, as well as trustworthiness, personal responsibility and consciousness. Trainees were also led, in the course of the after action analysis, to consolidate problem solving competencies, relational competencies and strategy-related competencies. These competencies followed logically from the application of the metacognitive processes of reflection and inquiry.

To summarize, the interpretive analysis provided evidence that the Debriefing sequence relied primarily on reflection and inquiry (*Proposition 1*), and was shaped by a combination of instructional, functional and socio-cultural features (*Proposition 3*) which, in turn, enabled the development of distinctive categories of individual and relational leadership competencies and skills (*Proposition 2*).

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**Table 8**

**Action sequence**

<table>
<thead>
<tr>
<th>Action task</th>
<th>Cognitive processes</th>
<th>Simulation-based training features</th>
<th>Leadership skills (competencies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conduct of the mission</td>
<td>- Experimentation - Reflection</td>
<td>- Semantic and symbolic (script) - Functional (3D virtual environment, radio communication) - Trainees’ profile (expertise, emotional states)</td>
<td>- Sense-making and solution implementation (problem-solving) - Emotional awareness (self-awareness) - Adaptability, self-control, consciousness, personal responsibility (self-regulation) - Decision-making, anticipation (strategy)</td>
</tr>
</tbody>
</table>

**Table 9**

**Debriefing sequence**

<table>
<thead>
<tr>
<th>Debriefing task</th>
<th>Cognitive processes</th>
<th>Simulation-based training features</th>
<th>Leadership skills (competencies)</th>
</tr>
</thead>
<tbody>
<tr>
<td>After Action Analysis</td>
<td>- Reflection - Inquiry</td>
<td>- Functional (MRS, maps) - Socio-cultural - Trainees’ profile</td>
<td>- Reflexivity, emotional awareness, accurate self-image (self-awareness) - Trustworthiness, personal responsibility, consciousness (self-regulation) - Meta-cognition, sense making (problem-solving) - Communication (relational) - Challenging, learning (strategy)</td>
</tr>
</tbody>
</table>
Discussion

Implications for Scholars
This article adds to the literature on leadership development by establishing an integrated framework for studying the interaction between SBT’s cognitive processes, features and outcomes, and assessing the enabling conditions for simulation-based training to actually support leadership development. By showing how people’s cognitive processes are shaped by SBT’s instructional and socio-material properties [Sousa and Rocha, 2019; Bourdeau et al., 2020], it suggests that if features and processes mobilized by trainees are consistent with each other, adjusted with the goals of the learning activity, and aligned with trainees’ profiles, then the consolidation of intrapersonal and interpersonal leadership skills is facilitated. Otherwise, SBT is likely to produce a psychological discomfort that may detract from people’s learning experience and inhibit the consolidation of leadership skills. Specifically, by pointing to the critical importance of aligning trainees’ profiles with SBT features and learning goals, this contribution shows that the primary factor enabling individuals to actually develop leadership skills is their capacity to mobilize and harness the full benefits of pragmatist learning processes (i.e., experimentation, reflective thinking and inquiry). In that view, our case study identifies four additional cognitive processes (i.e., information gathering and integration, ideation, and translation) that come to complement pragmatist learning processes, primarily by supporting people’s creativity and problem-solving capacities during learning tasks that involved situational awareness and sense-making (i.e., Planning sequence).

More broadly, this research provides a richer view on simulation-based leadership development programs in which their effectiveness depends upon what trainees do, both physically and cognitively, when they engage with the various tasks and resources that make up the learning environment. It results in a performative and context-sensitive rather than a universalistic view of simulation-based leadership development [Clarke and Higgs, 2016], with intrapersonal and interpersonal leadership skills being formed in and through iterative and collective processes of experimentation, creativity, reflection and inquiry.

Implications for Managers
The first implication that managers can draw from this article is that SBT’s goals, structure and features that should be carefully designed in order to deliver trainees with technical and non-technical resources aligned with their level of expertise and professional experience. Considered as learning resources, SBT’s functional, instructional, physical and socio-material properties have to be sufficiently diverse, accessible, available and consistent to ensure that trainees feel free to experiment while engaging in training tasks, and are capable of accumulating experiential knowledge that is valuable for them and for their parent organization. Within this framework, trainees’ practices (what they do) can lead to the establishment of transitional socio-material assemblages that change with the particular demands characterizing each training task, and are supportive of experimentation, reflection and inquiry processes. Then, depending on the availability and accessibility of socio-material, emotional and psychological resources, and on the consistency of trainees’ learning practices (defined as combinations of resources), SBT can foster (or impede) the development of intrapersonal and interpersonal leadership skills.

This leads to the second implication, namely that managers should assume leadership skills are neither stable, nor systematic but the temporary outcomes of a dynamic process of enactment [Schultzze and Orlikowski, 2010], the latter being highly sensitive to trainees’ profile. In this view, trainees’ learning practices are constitutive of individual and relational leadership competencies, the latter being elaborated in and through the implementation of SBT leadership exercise [Raelin et al., 2018]. It follows that leadership skills are to be understood by managers as situated and performed constructs, which become parts of people’s training environment and professional identity, and are then likely to change through contingent reconfigurations of training’s features, processes and goals.

Concluding Remarks
This article aimed to enrich our understanding of the enabling conditions for simulation-based leadership development by establishing a framework and assessing its intelligibility and validity through an interpretive case study. It should thus be considered a first step towards improving our understanding of the enabling conditions for simulation-based leadership development to occur. Further research is thus needed to assess the conditions for our framework to be applicable to other empirical contexts. In particular, future research could aim at exploring how certain combinations of SBT’s features and processes affect the development of certain types of intrapersonal and interpersonal leadership competencies in other empirical contexts. This may provide additional exemplary knowledge to extend the validity of our framework.
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GOOGLE SCHOLAR


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