



Case Study Report on Facilitation Interventions to Increase Learning Effectiveness in Game Simulations

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Marieke de Wijse-van Heeswijk, Etiënne Rouwette,
and Joeri van Laere

Overview

Two extreme case studies are highlighted in this follow-up chapter (this is a practical case study following up on Chap. 4 with a theoretical base) on how facilitators can enhance learning via interventions. Case study 1 consists of a positive open simulation game (learning results and goals achieved), containing optimized conditions for learning and several facilitated interventions per game phase. The open simulation game case study delivered learning early on in the gameplay and resulted in mainly third-order learning (learning to learn, a well-developed role perspective on how one can add value from their role). Case study 2 consists of a negative rule-based simulation game (goals were not achieved, few learnings) with diminished learning conditions and the lack of impact of facilitated interventions per game phase. The learning results of the negative case study 2 were limited because participants did not perceive the game as useful and experienced the mainly content-oriented interventions by the facilitator not as helpful. The extraneous cognitive load resulting from the gameplay disturbed the effect of the process interventions by the facilitator, so participants did not learn from the guidance the facilitator tried to provide.

M. de Wijse-van Heeswijk (✉) · E. Rouwette
Radboud University, Nijmegen, The Netherlands
e-mail: marieke.dewijse-vanheeswijk@ru.nl

E. Rouwette
e-mail: etienne.rouwette@ru.nl

M. de Wijse-van Heeswijk
Research and Intervention Methodology, Management Sciences, Radboud University,
Nijmegen, The Netherlands

J. van Laere
University of Skövde, Skövde, Sweden
e-mail: joeri.van.laere@his.se

Discussing these two opposite extreme case studies provides an overview of what conditions favour learning and what interventions contribute to learning. In the previous chapter, it was highlighted that facilitators can enhance learning complexity reduction (or attenuation) and skill enlargement (amplification). In the case studies, the types of interventions performed are highlighted and explained so they provide two contextualized examples of how interventions added or left out have effect on learning combined with the internal conditions of the rule-based and the open simulation game.

Keywords

Facilitation • Intervention • Learning effectiveness • Debriefing • Reflection • Instructional design • Rule-based simulation games • Open simulation games

Learning objectives

You will be able to:

- learn about the results and conditions of the positive and the negative case study to design a contextualized facilitation approach for your simulation game.
- reduce extraneous cognitive load—ECL—(distraction from the learning goals) and increase germane cognitive load—GCL—(energy directed at the learning goals) enhances learning effects of SGs;
- optimize the introduction and phase before the start of the game so participants are well-prepared to learn from the simulation game;
- design learning loops to optimize learning from experience during the gameplay, in time out reflections and structured reflection and debriefing;
- design your interventions around agency (experience of players they have influence on what they are learning) and motivation of participants so they want to learn from the game and are not surprised if they experience frustration during the gameplay and show learning resilience.

5.1 Introduction

In this short introduction, we summarize the main findings from the theoretical chapter on facilitation interventions to increase learning in simulation games (from now on we will use the abbreviation SGs). This is useful input to understand and analyze the case studies described later in the chapter and to relate to your own work practice as facilitator and/or designer of SGs. In summary (see Chap. 4), facilitators can choose from two strategies to enhance learning in simulation games:

- I. **Reduction of extraneous cognitive load** (ECL meaning stimuli from the game environment that distract participants from their learning). In systemic terms, this is called *attenuation* (see Ashby’s law of requisite variety in Chaps. 4 and 7). By reducing ECL with facilitated interventions, learners can focus more on their learning goals.
- II. **Developing skills of participants.** In systemic terms, this is called *amplification* or in normal English adding to the repertoire of participants to learn and deal with challenges (see also Ashby’s law of requisite variety in Chaps. 4 and 7).

Both strategies contribute to motivation and agency, another important factor in learning (Deen, 2015; Hartevelde, 2011; Lee-Kelley, 2018; Tieben, 2015; Watt & Smith, 2021). Via reduction of ECL participants can ‘see the trees from the forest’. And via skill development (as in decision-making skills, reflection skills, learning to learn) participants can deal with the challenges they are offered and add to their learning repertoire as well as enhance the development of their frames of reference. Frames of reference are the ‘mental models’ participants bring into the game based on their previous experiences and knowledge. Participants experience more agency and motivation if they feel the self-efficacy (the participant has a feeling he or she can achieve the goal), they understand what is expected of them in learning from simulation games and when they receive personalized feedback on their actions (for extensive academic sources, see Chaps. 4 and 16).

For more information on resources behind these interventions, see the previous Chap. 4. A summary of possible interventions aimed to enhance learning is provided in Table 5.1.

Table 5.1 Overview of types of facilitated interventions to reduce cognitive load and increase germane cognitive load

-GCL. Types of interventions		Description	Attenuation or amplification	Sources
Types of interventions before the gameplay mainly aimed at reducing ECL				
Interventions of the facilitator aimed at reducing cognitive load that do not contribute to learning so participants can increase their GCL				
I.	Buy into interventions	Actions of the facilitator that contribute to the participants accepting the facilitator in his or her role, accepting the simulation game and accepting the learning environment as a whole including the other participants	Attenuation	Inductive developed concept developed based on 10 case studies, De Wijse (2015–2021)
II.	Team building interventions	Any kind of activity that is oriented toward group development, so the group is	Amplification and Attenuation	Team building sources in general Lacerenza et al. (2018) and functional role

(continued)

Table 5.1 (continued)

-GCL. Types of interventions		Description	Attenuation or amplification	Sources
		functioning as a team in the GS, for instance having a group activity in which participants get to know each other, a role division activity		division Vennix (1999)
III.	Framing interventions and establishing a learning contract	Framing is a technique that is aimed at enhancing relevance and meaning of the learning goals in relation to the simulation game	Attenuation	Fanning and Gaba (2007) for framing in training and development (Anderson et al., 2014; Frank & Scharf, 2013; Laycock & Stephenson, 2013) for establishing a learning contract
III a.	Framing intervention for expectancy guidance	Questions on expectancy guidance are an example of a framing intervention that simultaneously establishes a learning contract (taken from 3 case studies De Wijse, 2015–2021) what do participants expect; 1. Toward the session.2. Toward the SGs, 3. Toward the facilitator, 4. Toward each other	Attenuation	General sources on expectancy in relation to training Eccles et al. (1998), Plass et al. (2015), Sweller et al. (2007)
III b.	Storytelling as intervention during introduction	Storytelling is making use of a narrative to bring logic in information transfer, when used in introduction the scenario, roles, rules and resources can be connected in a meaningful way for participants who need to learn to play the game	Attenuation and Amplification	Kickmeier-Rust et al. (2011)
IV.	Frontloading intervention	Frontloading on roles, frontloading on learning from SGs,	Attenuation	Fanning and Gaba (2007)

(continued)

Table 5.1 (continued)

-GCL. Types of interventions		Description	Attenuation or amplification	Sources
		frontloading on the content of the simulation game, so people know what to expect and so they can plan for actions in the game in line with their ambitions and learning goals, this reduces ECL and increases GCL		
V.	Goal setting intervention	On a personal level, the translation of personal goals toward goals in the gameplay	Attenuation	General sources on goal setting Arraya et al. (2015), Fandt et al. (1990), Garcia-Marquez and Bauer (2021), Kolfshoten and Rouwette (2006), Nebel et al. (2016), Plass et al. (2015)
VI.	Phase Zero intervention	Have the participants prepare before the gameplay on how they think they can achieve their learning goals in the SG, some teambuilding if there are teams and the teams goals in the SG	Attenuation	Nakamura (2021), Janich (2016) provide a more general description

Types of facilitated interventions during the simulation game and in time outs

The facilitators focus of interventions in the gameplay phase is to attend to signs of unnecessary ECL and stimulate skills that contribute to achieving learning goals (learning to learn, reflective skills, decision making skills and communicative skills)

VII.	Reflection time outs intervention with individual, group and organization levelling to attend to dysfunctional variety and focus on learning goals	‘Red thread’ reflection with open questions, relations personal learning goals to (role)group and organizational goals/sustainable survival goals Pre structured reflections basics 1. What went well? (encourages to find positive learning)	Attenuation	Lee-Kelley (2018), Yang et al. (2018)
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(continued)

Table 5.1 (continued)

-GCL. Types of interventions	Description	Attenuation or amplification	Sources
	2. What needs improvement? (encourages to find leverage points for learning) 3. What do you need from yourself and from others to achieve your goal (s)? (encourages to reflect on a third order level to see how one can add value and what is needed from others)		

After the simulation game

The facilitators focus of interventions in the gameplay phase is to attend to signs of unnecessary ECL and stimulate skills that contribute to achieving learning goals (learning to learn, reflective skills, decision making skills and communicative skills)

VIII.	Structured interactive debriefing reflection is a proven method for increasing learning effectivity	We suggest to debrief from individual level, to role group/team level to simulation game (organization) level and transfer to reality. Everyone can contribute this way and relevant matter is sifted out via this system while meaningful exchange happens in multiple cycles. We recommend using flip over sheets with pre structured questions pre written on flip over sheets or in online environments an interface that allows for individuals and teams to have a personal space in which they can add their own learnings and reflections	Attenuation	General sources on debriefing structures Fanning and Gaba (2007), Fraser et al. (2018), Keiser and Arthur Jr (2021), Raemer et al. (2011), Tannenbaum and Cerasoli (2013), Wang et al. (2011)
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In the case studies in paragraph 3, these interventions together with the interventions on interaction level (first order, second order and third order) are discussed in relation to the learning effects. In addition to this generic approach to intervention design, your facilitation approach should also always be contextualized (Tsoukas, 2017). This is not a contradiction but a useful adding. We offer you contextualized case study examples in this chapter to learn how contextualization is necessary and adds value. Research tells us (Deen, 2015) we need different approaches for participants with different backgrounds such as.

Experienced participants that have more well-developed schemata require a more elaborate briefing, framing and frontloading (explaining on the meaning of the components of the SGs such as roles, the learning process etc. in the larger learning context) as opposed to, for example, students without relevant working experience. The less experienced the participants, the shorter the introduction should be, because then there is more time needed for making the translation from the learnings in the game toward learning goals because participants still need to develop their schemata during the simulation game to understand what is relevant (Klabbers, 2009; Lukosch, 2018).

1. If participants are used to work together, team building can have another setup than in the situation where participants do not know each other yet. For instance, participants that know each other do not need elaborate introductions but they need sharing of personal goals. If participants do not know each other, a short activity that helps them go through the norming, forming, storming phases (Tuckman and Jensen, 1977) can aid so group dynamics won't generate distracting cognitive load in the gameplay.
2. Participants that are used to learning from SGs/learning from experience in an interactive way often respond differently to learning from simulation games because they know what is expected of them (please do check their expectancies and experiences regarding the types of simulation games they played before, if these were just push-the-button/test-the-system digital management games they need to be prepared for the type of social interaction in relation to learning goals they are going to experience in your specific simulation game context if this is a different kind of experience). We do expect you to organize interaction and reflexivity on top of providing just a game simulation interface because by now having read through this book you know providing the interface is not enough to optimize learning.
3. Other influential factors from the context of your participants might impact outcome as well such as in organizational change the level of urgency can influence motivation to want to learn from the game play. Framing within the larger context as intervention can become important to establish relevance and meaning.

The game is intended to get the best behavior out of the participants, instead of just trapping them in their (normal) ways of behaving. In certain rule-based simulation games, the autonomy of participants may be restricted in such a way they also receive limited feedback and have limited options to follow their own learning path and experiment. It is helpful to analyze what restrictions a simulation game

contains and how this may affect the learning interventions needed from a facilitator. A rule-based simulation game for this reason might need more interventions aimed at reflection in learning to move beyond the ‘good or bad’ feedback mode so participants understand the reasons behind the feedback from the simulation. A basic condition for any type of learning to occur is that participants need to be able to develop their schemata and for this to happen a certain connection to their original schemata and experimentation options are necessary (Leigh & Spindler, 2005; Lukosch, 2018). We discussed theoretical implications and input and research on facilitation design in Chap. 4. Now it is important to study how this relates to practical case study examples with the following research question:

How can a facilitator contribute to the learning effectiveness of SGs via facilitated interventions aimed at learning skill enlargement, reduction of ECL and increase of GCL?

However, theoretical outcomes do not necessarily match practical outcomes, or in scientific terminology, the design science does not automatically match the analytical science. Design science here means the intervention SG as intended situated in contextual specifics that influence outcome, analytical science here means the outcome of SGs in the form of a causal theory that can be generalized and holds truth over different contexts (Aken, 2004). It is important to discern analytical science from design science in this context because both do not always consistently apply to simulation games and both show a different perspective on simulation games. Outcomes of simulation games should therefore be studied in context and sometimes causal relationships can be drawn for instance between interventions of facilitators and learning effects with participants but this does not mean this causal relationship will hold over all those different contexts simulation games are used in. For instance, if interaction is important for experiential learning and participants are not used to interactive learning, they might become passive even if a facilitator executes all kinds of interventions to optimize interaction. So the design as intended does not always automatically produce the supposed outcome and contextuality is key also from an analytical science perspective trying to uncover causality.

In a rare qualitative study on application of facilitation strategies by Nguyen et al. (2020) in a medical simulation game context results showed facilitation strategies were similar across different simulation game contexts. So far in our research, we find it possible that on a meta level similar interventions can be discerned, while their practical outcomes differ considerably and are highly contextualized. So, we use the best of both worlds; the analytical sciences for their hypothesis and causality and the case studies for the contextualized and action-oriented design sciences perspective. Since an intervention as intended does not necessarily resemble the outcome so we have to remain careful and after having developed a meta theory to contextualize it to specific practice (Tsoukas, 2017). We need more research from a practical point of view to draw conclusions if theory (as intended) and practice (as the real outcome) are aligned and consistent enough to find if the answers to the research question hold truth on a meta level across different simulation game contexts.

5.2 Methods

To answer the research question, qualitative case studies are suitable as there is a research gap with respect to the effects of facilitated interventions in SGs (Lukosch, 2018; Mayer et al., 2014). Due to the lack of research in this matter and the inherent complex nature of SGs (Bekebrede et al., 2015; Klabbers, 2018; Lukosch, 2018; Raghothama, 2017), it makes sense to first conduct explorative qualitative research. The case study data consist of interviews, observations, recordings and documentation that provide in depth, contextual information on (not) learning of participants in gameplay, reflections and debriefing from which we can derive case study descriptions that aid in answering the research question (Table 5.2).

The case studies allowed for research in action. I as a researcher was able to ask interview facilitators and participants before the gameplay and had access to additional relevant documentation. In addition, the researcher could ask questions during gameplay and after debriefing on the rationale of the facilitator and participants. The observing researcher avoided talking to the participants as much as possible to avoid contamination of the research material. Any exchange potentially influences learning and hence should be avoided. The best possibility to research and understand a social system is to perform real-time observation (Denzin & Lincoln, 2008) so we can provide answers directly from experienced facilitators in the field.

For case study selection, we followed the example of Miles & Huberman and selected studies that were at opposite ends of positive and negative learning effects. One of the selected case studies was an open simulation game in which participants learned extensively and were positive on the results. The other case study was a rule-based game simulation session that resulted in limited learning results. The extreme case studies can illustrate how facilitation can enhance learning and how if facilitation is not adequate it can impede learning. Also, the choice for deliberately choosing a rule-based and an open case study can contribute to finding factors that explain the difference in learning result. Miles et al. (2020) refer to Judd, in which Judd state standardization of case studies does not come from their systematic analysis. Swanborn (2010) advises to use critical cases to discover the difference in outcomes. We selected these case studies from a list of 18 case studies collected and documented from 2015 to 2021.

Both case studies took place within the same commercial company, in both case studies, different management layers were involved. In the rule-based case study, new employees were involved, in the open case studies, all employees were working with the company for at least 5 years. Two case studies were studied within the same company were deliberately selected, the purposes of the case study were similar, namely in both the aim was employees were required to learn the new ways of working within the new agile structure of the company. The case studies were not related. The researcher coincidentally could gather two case studies within the same organization 2 years apart. It is interesting to see how results differed in the rule-based setting as opposed to the open simulation game setting. In the open

Table 5.2 Case study background information table

	Company	Participants/facilitator characteristics	Gameplay and reflection time	Game structure, roles, scenario
Case study 1 Open simulation game	Telecom company	12 employees of telecom company More than half had previous game experience	3 game rounds, 3 reflections including plenary debriefing, total of 5 h	Low in parameter value because of no specialized tasks within departments and only role
		Facilitators (external consultants familiar with the organization) one male one female aged end 40, both 10 years of experience in facilitating games	Introduction time approx. 25 min with sheets with pre structured reflection Debriefing time 40 min with extended voluntary debriefing (because participants kept exchanging experiences in the bar)	Dependencies between the 3 different departments, no procedures or forms present, use of a building metaphor
Case study 2 Rule-based simulation game	Telecom company x (case study at the same company as case study 1)	10 New employees of telecom company x 2 with previous game experience One facilitator aged 55 (free-lance consultant, former employee of the company), 10 years of experience in facilitating games	3 game rounds, 3 reflections including plenary debriefing, total of 5 h Introduction time 1,5 h with sheets No pre structured reflection Debriefing time 20'	High in parameter value because of specialized tasks of the roles in the departments, and between the departments. 3 different departments, specific rules and procedures per phase and per function, use of a technological metaphor

* Parameter values in the table refer to the matter of complexity of the game structure stemming from socio technique discussed in Chap. 4

simulation game, the researcher was asked to guide a design process for a custom-made game with a consultant company that had been working with the company for over 12 years. The consultants provided input on the organizational structure and what the model of the simulation game should consist of. This was translated into a more abstract game model to optimize the learning. It was intended as being recognizable enough to experiment with new behaviour in agile working.

The open SG contained as few rules as possible resembling practice, just roles were divided, and similar tasks would be performed in the client organization. There were no tricks or other types of extras hidden in the open simulation game, it was purely a representation of their new working conditions taking place within a metaphor on an abstract level. The researcher had the opportunity to witness the game session and play a role within the scenario if she wanted to find out what was happening in the simulation game. Before, during and after the simulation game, the researcher interviewed the two facilitators on intentions and outcomes.

The case study data collected consisted of transcripts from the rule-based game and written interviews, the data in the open simulation game were recorded and transcribed and the interviews before and after were transcribed as well. All participants and facilitators in both case studies were informed of the study during the invitation. Again, at the introduction at the start of the game, they were asked if they had any objections toward the research as part of a PhD study at Radboud University and the presence of the observer. It was explained that all transcripts would only be used by the researchers involved and that all used transcripts, material and results would be anonymized. All agreed to the study.

5.2.1 Case Study Outcomes

In this paragraph, results from case studies, interviews with facilitators and literature study are discussed. Findings that contribute to the research question are highlighted. We selected thematic quotes from the cases and interviews and used available literature to further illustrate the relevance.

5.2.1.1 Simulation Game Description Used in This Case Study

The aim of the organizational change project was to change the company culture from a bureaucracy into an agile organization to meet changing demands from the environment. An organizational structure change had taken place; however, the organizational culture existing before this change undermined the new structure and its cooperation. A series of nine sessions of this game were conducted first with the management, later with mixed groups that all attended a training program containing this game. Five facilitators were trained to work with this game. All sessions had similar outcomes regarding conclusions drawn and lessons learned. One specific session is described here that took 4 hours of playing time and three playing rounds with a debriefing. In total, the intervention lasted from 9.30 in the morning to 16.15 in the afternoon. 17 people participated in this session, one female and the rest male. The facilitators consisted of one female and one male consultant from an external consulting company. Most participants expressed they had played games before, also with the consultants involved. The scope (handling space) was comparable to the scope participants had in practice, they were free to experiment and make their own decisions because there was nearly no hierarchy (just one informal layer) and there was extensive autonomy. Rules were absent except for the fact that one was assumed to be a team player and take responsibility for his or her acts.

The distance (how participants perceive the meaningfulness and relation to their real work) was experienced being low meaning that the participants recognized the relevance to their daily work. Participants quickly connected to their roles and recognized the reality they faced and related this from round 1 to their working practice.

5.2.1.2 Chronological Description of the Introduction, Gameplay and Debriefing of Case Study 1

The female facilitator conducted the introduction and she had approximately 12 sheets prepared, they were built up in a specific phased in following order.

Phase 1, general introduction of the aim of the game in the larger organizational culture change programme, was meant as a framing intervention. Phase 2, introduction of the game (with three levels of frontloading) metaphor and roles including a description of the processes in the game while explaining this, was their future organizational structure with as few rules as possible as in reality in their organization. They aimed at proactive, communicative, team-oriented behaviour that was part of an agile way of working with regular quick meetings involving all stakeholders including customers. There was frontloading on the role explaining some roles in the game would require more activity and were more challenging. Participants could choose their role themselves as much as possible. There was frontloading on the use of the metaphor of the game and the game's structure. In addition, there was frontloading on the process and content of the game, what was the aim in the gameplay and what result was expected in the form of satisfied customers and efficient cooperation. The aim of this intervention was to have participants choose their own roles after they knew what the roles contained, so this could add to experiencing agency for their actions.

Start of phase zero with team building, goal setting on individual and group level

After the introduction, a few questions were asked and then phase 0 was started. Participants could read about their role, deliberate with their teams on their aims and part two of this phase 0 was goal setting on their personal aim in the game and write these on a role group flip over. The facilitators checked if everyone was ready, one question was asked (so there were very few unclarities at the start of the game and all had sufficient preparation time) and answered and then started the first game round, providing participants ca. 30 minutes for the gameplay. Team building had already taken place in the preceding training program before the start of the simulation game.

Gameplay

The participants immediately started playing their roles, some were more outgoing in making contact with the other roles and some remained calm observing, asking an occasional question to the facilitators.

Reflection time out after each game round

After round 1, the facilitator called a time out with guided questions and asked teams to reflect within their role groups on their personal goals and the goals they had in the game with the questions ‘what went well, what went not so well and what do you need from yourself and from others to improve?’ written on to a flip over, and participants were told they would repeat this timeout procedure after the second game round.

The groups stood around their flip overs and discussed what happened and exchanged their different points of view, their learnings and assumptions and their ideas for solutions. They also found they made assumptions and thought they had understood what the others were doing. Participants often were a bit disappointed in feeling that their ideas were not adopted, and some expressed they had waited for others to come to them to ask for information. From an intervention perspective, this reflection enabled reduction of useless variety by focusing on learnings and exchange and it enabled participants time to learn and reflect with each other enhancing their skill in dealing with the challenges in the gameplay.

A short discussion followed on how different roles were performed and what the roles needed from each other to have added value. The second round was played and another similar time out was conducted in the same way and delivered the insight that it was frequently observed that participants unconsciously added dysfunctional unwritten rules to the roles they performed. Some thought they had to wait for orders, others thought that they would receive information, others thought that certain actions had already been performed by others and that these actions were not part of their roles. Customers played by facilitators in the gameplay had not had the contact and confirmations they were looking for and felt neglected. All the roles responded a bit frustrated; they perceived they worked really hard and had met customers’ needs while customers receiving the end product were surprised sometimes in a negative way by the outcome. The central conclusion from round 2 was, that they were still behaving in a bureaucratic way inventing their own rules and having much too less contact with each other. They expressed ‘we are even doing this in a very simple game containing few roles and rules!’. Here the valley of despair set in. Valley of despair is a known phenomenon in SG, this is a period in the gameplay in which frustration usually precedes learning. The level of frustration causes participants to take a learning leap and try new behaviour see (Wenzler & Chartier, 1999). The valley of despair appeared because participants had worked hard but did not receive the positive result they aimed for. Their customers were not satisfied with the communication and did not feel involved and happy with the end result. ‘The dysfunctional behaviour is not timely recognized by us’ they stated, ‘we need to start behaving more communicatively and proactively and we need to be discussing our behaviour and checking for feedback on the process with the parties we work with’. In the third and final game round, the participants had the opportunities to experiment with the new behaviour (more contact, more feedback asking on the process) and noticed this worked a lot better. Here they organized their own learning loops in the process. They seemed quick at letting go of their own self

invented rules and assumptions and also expressed during the gameplay 'I will do this now differently, I will more regularly contact the customer directly and ask for feedback'. It helped that they got quick feedback on their actions by the feedback they organized themselves in the cooperation process.

Debriefing

The debriefing served as a wrap up (this was possible because the in-between time outs already covered a lot of learning and served as a red thread of learning in chronological order following the game developments over different game rounds). First, the role groups would gather around their flaps and were asked to reflect on their journey through the gameplay by looking at the flaps with pre-structured questions they made in the previous rounds and drawing some final conclusions which they would share in a plenary session. The game was very immersive to them so after discussing these results, the facilitators added an extra debriefing after a break to talk on their game learnings with reflections to their realities and what it had meant for them personally. There was much motivation to contribute to this discussion and also the facilitators added extra behavioural observations because there was still a lot to discuss on what happened in the game with enthusiasm and satisfaction on the final result.

Analysis of case study 1

The buy-in in this case already more or less happened before the simulation game. All participants knew the trainers well because this was the third training day in the second block of four blocks of training within an organizational change trajectory. The introduction of the facilitators started with the why of the simulation game and a short explanation on how learning can happen in SGs via experimentation and sometimes also frustration. The facilitators asked the participants on their previous experiences with SGs so they could manage the expectations toward this fairly open form SG. They were asked to behave like they would normally do. Goal setting, frontloading, framing and expectancy management were naturally integrated in this short intro with sheets of 15 mins. The introduction by the facilitator prepared participants well, they understood how to act in the simulation game quickly. Because they had an introduction that shared the goals of the game, the goals in the game and what roles were present. Also, they could choose their roles adding to their feelings of agency. The participants already knew the facilitators and this probably explains at least partly why they accepted the facilitators and the information provided soon and went to work without questioning. The preparation phase 0 gave them an opportunity to prepare and form a team, they were asked to relate their personal goals to the team goals and prepare for a cooperation strategy in the first round of the game. The participants already experienced motivation and agency at the start of the simulation game because of the successful buy into with the facilitators in combination with the introduction and preparation they had. The open simulation game did not raise many questions with participants, they immersed quickly and accepted the game model. Also, because they all worked for the same company, they were already familiar with the company's culture and

recognized quickly the traps they created for themselves. They behaved naturally which caused them to reflect for the first time on how functional this behaviour was in the light of their learning goals. This reflection started quite early on in the game. Probably, this can be explained by the fact that they knew each other fairly well beforehand, they already developed a constructive learning atmosphere in the group and in connecting to the facilitators. They all had been working for the same company for numerous years and therefore were able to quickly recognize the same dynamic happening in the simulation game. They accepted the fact that they recreated this dysfunctional behaviour themselves because they were offered a simple task within a simple organization structure that resembled their new ways of working. The learning early in the gameplay enabled them to maximize their experimentation and hence they learned about what worked and what didn't. This was further catalyzed by the regular time outs with guided reflections and debriefing organized by the facilitator. They carefully build up reflections on their goals from the start. From an individual level, to group, to organization level so debriefing served as a closing final learning loop and wrap up, so they moved effectively through the valley of despair which helped them to change their assumptions and behaviour. They were not distracted by extraneous cognitive load and could focus on their learning and reflection from the start both in the gameplay as well as in reflection and debriefing. The debriefing could serve as wrap up with some clear learning goals to keep for the future.

5.2.2 Case Study 2 Description with Applied Interventions for the Rule-Based Casus Introduction for New Employees

Simulation game description used in this case study

The rule-based simulation game contained a metaphor with a high distance for the participants (the metaphor used was not recognized as meaningful and relevant by the participants) and a low scope (they were assessed on how well they could follow a certain procedure). Participants were told how to behave in the introduction, but they were not able to make the connection to what this meant for behaving in the SG). The participants engaged in the gameplay while they were part of a new employee introduction program. The participants had not cooperated before and a few of them (2 out of 14) had played one or two SGs during their education. The educational level on average was applied university, and the average age was around 35 years old. The game including introduction was conducted from 9.30 to 16.45 in the afternoon. Each role was performed by a team consisting of three to five people having separate functions though they were expected to cooperate. They had to make use of rules and procedures provided in the game with every decision they could make.

Introduction, gameplay and debriefing description of case study 2

The facilitator did not know the participants beforehand and was just hired to perform this game on 1 day during an introduction program. During introduction, participants sat, listened and asked an incidental question. In addition, the facilitator shared the aim of the game framing in the programme ‘to become acquainted’ with the ways of working in the organization. Some team building activities during a social program would take place in the evening. There was no choice in who would perform what role, the facilitator appointed people based on his estimate that, at the director’s function, there should be some people with analytical skills. There was no phase 0 in which participants would reflect on how they would take up their roles.

The role division was assigned by the facilitator (no adding of agency because of participants not being able to choose their own roles). Participants had an elaborate introduction into the processes and procedures they needed to manage. The participants had no previous working experience in the processes offered to them.

Gameplay description

When the participants played several game rounds they started noticing that it was hard to cooperate when not knowing what the actions, information and role responsibilities were of the other departments outside their own (*ECL*). They were not aware they should share certain information at certain times to keep processes going. Frustration arose both among participants and the facilitator (*signs of the valley of despair setting in*). The facilitator intervened extensively on content and procedural rules, showed each department what forms they had to use and how they had made mistakes before by not writing down and sharing certain information (*ECL sign by facilitator followed by purely content and procedural interventions aimed at understanding how to play the game*). The participants tried to work with the instructions and went to look for information and ask other departments on their procedures. Three participants regularly asserted (while the others around them were nodding) ‘we do not know what to do, we do not know what information to share to who and when, we do not understand the roles of the other departments because we do not understand our own role’ (*ECL caused by the organization structure which was bureaucratic and procedures/forms/terminology in the game*). While they were checking up with their ‘colleagues’ from the other departments they shared their frustrations and tried to understand what they had to do. After a while eight of them gave up and did no longer actively engage in the gameplay. This resulted in a few people trying to make sense of certain procedures and exchanging some information while others kept being lost in their roles and the learning goals they had for the simulation.

Some of them kept asking the facilitator for directions until the last game round started, the facilitator conducted additional content interventions and showed the participants what to do by taking the forms and walking around with them to other departments and pointing at what information needed to be written where. Two persons in the simulation game talked about their frustrations while others became desperate and expressed personal anger also based on previous experiences in their

former working life (*internal cognitive load with potential personal bias to the current situation*). 10 participants seemed to remain in the valley of despair behaving mostly inactive only uttering frustrations and not being able to deal with the instructions they received from the facilitator. Two persons remained calm (*these two had played SGs before during their education*) and kept experimenting. One of them also reflected aloud on what he saw happening (both had a different cultural background, this may have helped them in behaving more adaptively in this new challenging situation). Some started talking on the evening program that was going to be a social program. Then an extensive time out started with the facilitator explaining aloud what was happening in the simulated environment and what needed to be done in the next round. After 20 minutes he expressed that 'I am going to help the directors and you can approach me here if you need help'. The next 20 minutes the facilitator explained the procedures to the directors and worked closely with them from their table. The facilitator incidentally made remarks on how he perceived the process was developing in terms of it being chaotic and that participants did not execute the game rules well enough. In the meantime, one of the groups approached the observing researcher expressing again their frustration and that they did not know what to do (*valley of despair*). In the last round, one department was active and the other departments just watched. They took on the role of distributing information and forms to everyone and telling what needed to be done with them. In the last round, some forms were filled out by a few.

Debriefing

Debriefing started. Participants sat down and the facilitator explained what happened in the simulation and that they did a lot better than in the previous round (which was not really true, the facilitator chose to do this because some improvements were made and he did not want the group to feel negative after leaving the SG). The participants sighed with relief and were sitting down not talking and just listening passively. The facilitator mainly talked. Only one of the participants responded enthusiastically on what he had learned and seen happening in the gameplay, that it was just like a real company and that he had seen the importance of the activities of the department that became active in the last round. He also expressed that he found it difficult to cooperate and be proactive. He realized he had to go out more to communicate instead of waiting and sitting and complaining. After the debrief, they went for the evening social programme.

Analysis of case study 2

Two main factors were most likely impeding the learning in this case. First, the rule-based simulation game containing pre-structured procedures, rules and terminology taking place in a metaphor (that was experienced as far from the participants reality, they could not relate to the metaphor used) distracted both the participants and facilitator from learning and applying effective learning interventions. The facilitator only used very few facilitated interventions to optimize learning. The unstructured preparation, the unstructured time outs and the unstructured debriefing did not aid participants in learning.

The buy in phase was overlapping with the introduction. The participants did not know the facilitator before. They perceived the facilitator as passionate about the simulation game and patiently sat out the 1.5 hrs introduction in the morning accompanied with theory and game setup introduction on sheets. There was frontloading on the content and procedures of the game and theory on what behaviour was wanted on an abstract level within the game metaphor. This can be considered as partly framing and frontloading because participants were new to the organization and did not have a frame of reference yet to connect the new information. There was no personal goal setting. There was no phase 0, no expectancy management toward previous SGs' experiences. A question was asked regarding what games they played before, but the facilitator did not ask about the experiences or drew comparisons toward the game they were going to play.

During lunch, a participant left. The rule-based structure probably played a role in participants making mistakes and developing frustration on not knowing what to do. The new processes, the roles they had to take in following procedures they could not understand and hence they made mistakes. Although the facilitator made extensive efforts with over 65 interventions on content and procedures to make them play the game as intended, he did not succeed. The participants were not able to learn from the game because even though they received first-order instructions. The SGs extensive rules and procedures impeded their learning and cooperation because of the internal complexity of the game. The participants suffered from the disturbances (ECL) derived from the rule-based structure of the SGs, which impeded them from receiving sufficient, adequate and timely feedback. The structure further led to alienation, loss of motivation and less feelings of agency. Also, the interventions of the facilitator did not contribute to their learning (see publication on learning effects in qualitative and quantitative outcomes of this specific case study publication expected 2023). They could have realized this and then invented their own approach and experimented with it if this would work. Instead, they got frustrated and unmotivated, maybe fuelled by many interventions of the facilitator they could not attend to, and which possibly contributed to more external cognitive load lowering GCL. The two participants that remained active finally got the hang of it and went through the valley of despair by trying out new approaches and combining with communicating to others on what they thought was needed. Because the debriefing was unstructured and the facilitator did the vast majority of the talking and asked mainly rhetorical questions, only a few learning comments from the participants were made on a meta level. There was no specific translation to their future working conditions. The debriefing took only 15 minutes and did not serve as a summary with highlights of the learnings of the simulation game. The facilitator mentioned a few observations and told the participants they were doing a lot better in the last 45 mins. The participants were interested in knowing what that 'better' had meant because the majority of them still remained lost in the fog. Only three people were active in the last 45 min.

Central impediments/enablers for learning derived from the case studies

In a simulation game, challenges are directed at participants to learn from. If these challenges are not aligned with the learning goals and/or personal learning aims of the participants, they can become impediments for learning. Here the impediments are shortly explained, they are explained more elaborately in the discussion and conclusion.

1. Game (Organizational) structure disturbances

As explained in the introduction, the internal complexity of the game's structure can cause impediments for learning because of delays in feedback, lack of autonomy, agency and motivation leading to less learning.

2. ECL challenges

These consist of all distractions that do not contribute to learning, for instance the participants find the facilitator annoying, the participants are irritated because of not understanding game instructions and materials.

3. Valley of despair

The valley of despair can work both in a positive and in a negative way, negatively if participants get stuck in the valley and do not find ways to enlarge their skill. Positive if the valley provided them with opportunity to learn from, when the participants receive negative feedback on their performance by the game model and/or facilitator and they are able to find new strategies and experiment their way out of the challenges. If this is the case, they have learned new skills they did not possess or applied before.

4. Expectancy and (cultural) bias challenges

Participants bring their own culture into the game potentially impeding learning because they behave according to their ideas on how to fulfil a role. If they remain in familiar behavioural patterns, they miss opportunities to experiment and learn from the gameplay.

5. Designed learning loops

SGs' added value should come from the opportunity to act and experiment in the gameplay. Learning loops can be pre designed into the game and time outs so participants are allowed multiple learning cycles and opportunities to learn from the SG. Sometimes the level of immersion can impede learning because participants fail to take time to reflect and learn from feedback making pre designed learning loops during gameplay and reflection necessary. Pre-designed learning loops for instance in the form of added reflection moments after the gameplay can add to the learnings and remaining overview on the participants' learning process.

In Table 5.3, the two cases are displayed side by side regarding the potential impediments/enablers for learning.

In Table 5.3, the central issues arising in many SGs are mentioned in the left column. These are issues that need to be addressed by facilitation for instance by generating learning loops enabling participants to enhance their GCL by focusing on their learnings and reduction of extraneous load by leaving out irrelevant findings, while simultaneously investing in enhancing their skill level to deal with the challenges from the game.

Comments on the number of learning loops per casus

In the rule-based casus, facilitated learning loops consisted of the time outs. However, the intended effect of the time out on reflecting and learning was absent because the facilitator talked and asked nearly no questions. In addition, the facilitator also focused attention on content and procedure and not on learning goals, role reflections and participant analysis of what happened. This behaviour of the facilitator impacted the learning opportunity in a negative sense. The rule-based characteristics of the simulation game make the role of the facilitator in enabling and facilitating learning even more needed for participants to gain overview, focus on learnings and make sense of the events from the gameplay. In a publication by de Wijse-van Heeswijk (2021) explanations are provided how it is possible rule-based simulations with high structural complexity inhibit learning. Shortly summarized a complex internal structure with dependencies generates less and slower specific feedback on the actions of participants. Less feedback opportunities combined with limited autonomy or handling space decrease conditions for experiential learning. Because for experiential learning to be optimized short cycled phases of action, reflection, analysis and conceptualization need to take place. If both autonomy and reflection inhibit learning from feedback, chances of learning are lower. A facilitator then needs to make opportunities for reflection and provide feedback for instance during time out reflections.

In the open simulation game, a number of learning loops were previously designed (these could have been applied in the rule-based case as well, this is not dependent on the type of simulation game). The added time outs supported the participants in reflecting on their previous experiences in the gameplay and making new plans related to their learning goals in the next game round. The debriefing could serve as a wrap up and was focused on clear outcomes. As a result of the phase 0 before the start of each game round, the most relevant learnings are shifted and focused within the role groups and later shared in the plenary session, GCL was optimized in this phase. The pre-debriefing within the role groups (pre-debriefing within mixed role groups could even attenuate more variety) allows for sense-making among the role group first before sharing in the central group, this reduces ECL (unnecessary variety) and increases GCL.

Table 5.3 Examples of impediments/enablers for learning

Impediments/enablers for learning	Rule-based case study	Open case study
1. Game (Organizational) structure disturbances	Present	Absent
	Participants complained during all rounds they did not understand the rules, procedures, and dependencies. Numerous questions were asked on game content/procedures and the facilitator performed a large amount of content / procedural interventions	The participants took on their roles quickly from the start and started experimenting with different behaviour. No questions were asked on terms, rules, procedures
2. Extraneous cognitive load	Present	Absent
	Participants experienced severe pressure from understanding the game impeding them to play the game as intended	Participants had no comments on external factors such as not understanding the game or other external factors
3. Valley of despair	Present	Present
	Participants could not make sense of the content/procedural interventions by the facilitator, the majority became passive and discussed in small group show they experienced the frustrations from not understanding the game, they also shared this in the time out reflections. In the end three participants started to facilitate their own learning (emergent facilitation, when participants start facilitating their learning processes themselves) by actively seeking feedback amongst each other mainly in the last game round	After the first game round the participants realised they were not going to reach their learning goals if they remained doing what they did. They planned for some new strategies. At the second time the participants realised that what they were doing was not delivering them the result they wanted and they tried some new behaviour based on the feedback they had resulting in a debrief in which they realized they had found many new solutions they hadn't realized they needed. Behavioural changes were made during the game and with enthusiasm and relief the participants left the debriefing and kept talking about what had happened and how this helped them to realize what they needed
4. (Cultural) bias	Present	Present
	Because these participants were new to the organization only their own cultural biases could have played a role. One participant commented on feeling in the same situation as	From the first-time out participants started noticing that their assumptions did not fit the SGAs challenges, they then started adapting their procedures and realised in

(continued)

Table 5.3 (continued)

Impediments/enablers for learning	Rule-based case study	Open case study
	<p>before when she was not helped by teachers. The two participants that had played games during previous education showed more learning behaviour in actively seeking feedback and not staying in a passive mode, which can be seen as a positive effect because they had a different approach to learning from SGs</p>	<p>timeout two that this was not sufficient. In round three and during debriefing they realized they invented their own rules and that these were not functional. That it was more about staying in contact with each other and seeing cooperation as partnerships working on the same aims that needed frequent cooperative meetings as in agile projects. This was also what the facilitators aimed for, that they realized what behaviour was not functional and that they could find out for themselves how to deal with the new ways of working while letting go of the old culture</p>
<p>5. Number of learning loops</p>	<p>Present at least 1 observed (we cannot look inside the heads of participants if they go through learning loops themselves)</p> <p>For the three participants starting to experiment one learning loop in the last round</p>	<p>Present at least 4 loops observed</p> <p><i>Learning loop 1:</i> Phase zero and round 1 the preparation of the gameplay on how players would aim for achieving their learning goals and finding out how this worked in practice of gameplay</p> <p><i>Learning loop 2:</i> reflection 1 and round 2 with reflection on what happened in the round and how this related to the players aims in the game and learning goals</p> <p><i>Learning loop 3:</i> debriefing with transfer to reality. The debriefing phase zero was a role group discussion on the results of the final gameplay and what happened with the learning goals of the participants in the final gameplay. Then a plenary sharing was started on the findings of each group. After</p>

(continued)

Table 5.3 (continued)

Impediments/enablers for learning	Rule-based case study	Open case study
		<p>which a short break and a move to another more relaxed room was made where the participants were enabled to talk further on their learnings from the gameplay and the relations to their working practice and how sustainable transfer could be achieved</p> <hr/> <p><i>Learning loop 4:</i> Because the previous time outs provided guidance and focus for the last debrief the participants could make use of their own experiences and learnings and the experiences of the others because they had a pre-debrief in their role group and then a central debriefing. The unnecessary variety was reduced, and the focus was brought by sharing in the role groups and then sharing in the central group</p> <hr/> <p>In addition, numerous learning loops were added by the participants during round 2 and even more in round 3 when they met more frequently and evaluated and reflected on in between results more often</p> <hr/> <p>Nb. there are probably many unordered learning loops happening during gameplay within the minds of the players we are not aware of and that we cannot design or measure</p>

5.3 Summary and Conclusion

From the case studies, it is visible how adding or leaving out facilitated interventions can influence learning. Especially in rule-based SGs, the effects of leaving out adequate facilitated interventions are enlarged in a negative sense. The restrictions in agency, autonomy and as a result decline of motivation inhibit emergent facilitation by the participants themselves. The open simulation game allows for active

experimentation and pro-active search for feedback by participants themselves, sometimes making the intervention role of the facilitator less important. Especially participants with learning resilience (they keep a learning attitude in frustrating and challenging circumstances, see Fisher and Law (2021) and game literacy (skills that enable people to learn from challenging and changing circumstances that are often encountered in SGs) can facilitate their own learning path through the SG. However, from practice, it is shown facilitators often add value to learning (Leigh et al., 2005; Lukosch, 2018; Tiwari et al., 2014) in reflection and debriefing (Fanning & Gaba, 2007; Keiser & Arthur Jr, 2021; Nakamura, 2021; Raemer et al., 2011; Tannenbaum & Cerasoli, 2013; Wang et al., 2011). We can conclude a well-prepared facilitator who knows the rationale behind two main types of interventions; skill enlargement and complexity reduction can perform an array of interventions aimed at learning. If a facilitator prepares and designs reinforcing learning loops from the start, these loops can function as leverage points for learning by bringing more focus and hence motivation to learning processes as shown in the positive case study. People that experience feedback is meaningful and helpful to them in their learning process are automatically more motivated to learn.

In the case studies, we have seen examples on how multiple interventions can be integrated into one facilitation approach. For example, in the positive case study, an introduction where participants receive frontloading and can prepare for learning in the simulation game and at the same time relate their learning goals toward strategies and behaviour in the game. During reflections that occurred regularly after for instance each hour of playing time, participants can reflect on and read just their strategies in relation to their learning goals or even adjust learning goals based on improved insight. Mainly process (second order) and role (third order) learning took place, norms were adjusted leading to different processes. The debriefing could serve as a summary of learnings and allowed for time to reflect on learnings in practice. Whereas in the other negative case study, we saw learning stuck on a first-order level while both facilitator and participants experienced frustration as a result of alienation and demotivation set in. Most participants were stuck in the valley of despair and experienced no handholds from time outs to improve their approaches. They did not feel involved or activated in the debriefing and only a few people were resilient enough to learn from some actions they performed in the last game round. Here the lack of interventions on reducing ECL and no interventions aimed at increasing skill resulted in a poor outcome. Reflection was not effective with only the facilitator giving instructions and without having guided questions. The debriefing resulted in the same inactive behaviour with the participants.

Some Questions

What contextual issues can play a role in designing your facilitation interventions? How is it possible that designing multiple learning loops (in the form of formative assessment reflection that aids participants in relating their experiences to learning) can serve as a reinforcing learning mechanism?

How can it be explained that rule based simulation can restrict learning from experience?

Future Reading

Specific literature into what interventions generate what specific effects in the context of SGs is very scarce, this research is a starting point.

Some related earlier publications related to practical research on this topic are:

- Nakamura, M. (2021). Unpacking and Disclosing the Reasoning behind “A Structured Instruction Improves Team Performance” conference proceedings ISAGA Indore 21.
- Raemer, D., M. Anderson, A. Cheng, R. Fanning, V. Nadkarni and G. Savoldelli (2011). Research Regarding Debriefing as Part of the Learning Process. *Simulation in Healthcare* 6(7): S52–S57.

In addition, since there is a lack of research from the game simulation community other fields can provide us with useful insights.

- Tsoukas, H. (2017). Don’t simplify, complexify: From disjunctive to conjunctive theorizing in organization and management studies. *Journal of Management Studies* 54(2): 132–153.

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Marieke de Wijse-van Heeswijk MSc. is external Ph.D. researcher at Nijmegen school of Management (Radboud University, the Netherlands, promotors Prof. Etienne Rouwette and Prof. Sander Meijerink). Marieke studies the effects of interventions in and around game simulations on learning/change with participants. Marieke is a member of ISAGA board (from 2004–2008 and 2021 until now) and a member of the Dutch ISAGA branch Saganet (since 2004) and NASAGA (since 2020). Marieke was Guest Editor for the special issue facilitation of simulation games in the *Game and Simulation Journal* and is now Associate Editor. Marieke was a change and learning consultant and game designer/facilitator for GITP International from 2004 until 2015. In 2015 she started her research on the effects of different facilitation approaches in various types of simulation games. Marieke uses both qualitative, quantitative and action research methodology and is used to a multidisciplinary research approach taking in perspectives from sociology, organizational sciences, public administration, and philosophy. She is also the host of the special interest groups Facilitation, Sustainability, and Game Science at ISAGA.

Etiënne Rouwette holds a position as a Professor at the Methodology Department of the Nijmegen School of Management, Radboud University (the Netherlands). He is the Chair of the Research and Intervention Methodology group. His research focuses on group decision-making and the impact of decision support methods on interaction, cognition, and behaviour. Etiënne currently supervises Ph.D. researchers involved in modelling healthcare, energy, security, and economics, as well as information exchange in groups and the impact of modelling on cognition. He lectures on empirical methods and stakeholder engagement, facilitated modelling, multiple scenario development, Electronic Meeting Systems, and gaming simulation in bachelor, master, and post-doctorate modules at Radboud University, Sioo, and Warwick Business School. Etiënne is the Academic Director of the European Master in System Dynamics, treasurer of the EURO OR Behavioural Operational Research working group, past programme Chair for ISDC conferences, and past President of the System Dynamics Society.

Joeri van Laere is an Associate Professor of Informatics at the University of Skövde, Sweden. He holds a Ph.D. from the Delft University of Technology, the Netherlands. His main research interests are crisis management, situation awareness, business intelligence, and facilitation and design of simulation games. Joeri has designed, facilitated, and evaluated over 150 crisis management exercises between 2005 and 2015 and studied how training in recurrent simulation games can enhance organizational learning. More recently, his research has focused on designing simulation games to develop public-private collaboration for critical infrastructure resilience, as well as innovating the training of fire-fighters with the help of VR technology.