Simulation & Gaming
43(5) 627–647

DOI: 10.1177/1046878112439649
http://sag.sagepub.com
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Goals, Success Factors, and Barriers for Simulation-Based Learning: A Qualitative Interview Study in Health Care

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Abstract

Introduction: This study describes (a) process goals, (b) success factors, and (c) barriers for optimizing simulation-based learning environments within the simulation setting model developed by Dieckmann. Methods: Seven simulation educators of different experience levels were interviewed using the Critical Incident Technique. Results: (a) The main process goals were to enhance learning, engage participants, and aid the application of what was learned during the course. (b) As success factors, educators stated their own competencies and attitudes, motivation and openness of participants, and a functional environment. (c) As barriers, educators stated a lack of willingness to actively engage in simulation by the participants and time pressure. The results emphasize the need to consider jointly the interrelated elements of simulation-based learning environments to optimize the use of educational simulation. Discussion: The results support the applicability of Dieckmann's setting model to describe simulation-based courses and emphasize the diversity of factors that need to be considered in optimizing simulation practice. This article can serve as a practical aid for educators within health care simulation settings and in other domains.

Keywords

critical incidence technique, setting model, educators, enhance learning, health care simulation, learning application, learning environment, optimizing simulation practice, process goals, simulation, simulator, , training

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We interviewed simulation educators, asking them for goals, success factors, and barriers when using simulation-based learning environments in health care. We used a sequential model of different interrelated phases of simulation-based courses to structure the interviews. The goals were formulated on a process level (e.g., enjoyment of training) and on an outcome level (e.g., application of theory to practice). Success factors were based on the active engagement of the people involved and clear interactions around clear simulation goals. Barriers stemmed from little active engagement and mismatches between goals, target group, and methods used in the simulation setting. The results can help to optimize the simulation setting as a whole—in health care and other domains.

A review article states that "high-fidelity medical simulations are educationally effective and simulation-based education complements medical education in patient care settings" (Issenberg, McGaghie, Petrusa, Lee Gordon, & Scalese, 2005, p. 10). The review reports essential elements for the success of simulation-based education, such as providing feedback, integrating simulation into a curriculum, and providing practice situations at variable levels of difficulty. Several reports describe aspects of the educational use of simulators (Gaba, Howard, Fish, & Smith, 2001; Rall, Gaba, Dieckmann, & Eich, 2010; Wallin, Meurling, Hedman, Hedegard, & Fellander-Tsai, 2007). Other reports analyze simulation and debriefing at different levels of detail (Alinier, Hunt, Gordon, & Harwood, 2006; Crookall, 2010; Dieckmann, Molin Friis, Lippert, & Østergaard, 2009; Fanning & Gaba, 2007; Henneman & Cunningham, 2005). Some reports describe facilitation methods and debriefing procedures (Lederman, 1992; Steinwachs, 1992; Raemer et al., 2011). Thus, we have convincing face value of simulation in health care and some evidence that some features help make simulation educationally successful (Boulet et al., 2011; McGaghie, Draycott, Dunn, Lopez, & Stefanidis, 2011).

However, many questions about optimal use and potential effects of simulation remain open (Issenberg, Ringsted, Østergaard, & Dieckmann, 2011). "Precisely why simulation and simulators work is not well known . . . there is a somewhat misleading conclusion that simulation (in and of itself) leads to learning" (Salas & Cannon-Bowers, 2001, p. 484). To further enhance the educational value of simulation, a process-oriented analysis of the current simulation practice is needed, going beyond descriptions of *what* is being done and investigating questions of *why, how,* and *for what* (Crookall, 2011; Dieckmann, Gaba, & Rall, 2007). The current study describes some of the frames underlying the actions of simulation instructors (Rudolph, Simon, Dufresne, & Raemer, 2006; Steinwachs, 1992).

The present analysis focuses on goals, problems, and good solutions in current simulation practice across simulation settings. It will thus improve our understanding of influencing factors during simulation and can guide the optimization of simulation practice in a goal-oriented way.

Previous work showed that a variety of factors influence how participants perceive simulation scenarios (Dieckmann, Manser, Wehner, & Rall, 2007) and how simulation instructors design and conduct simulation-based learning settings (Curran, 2008;

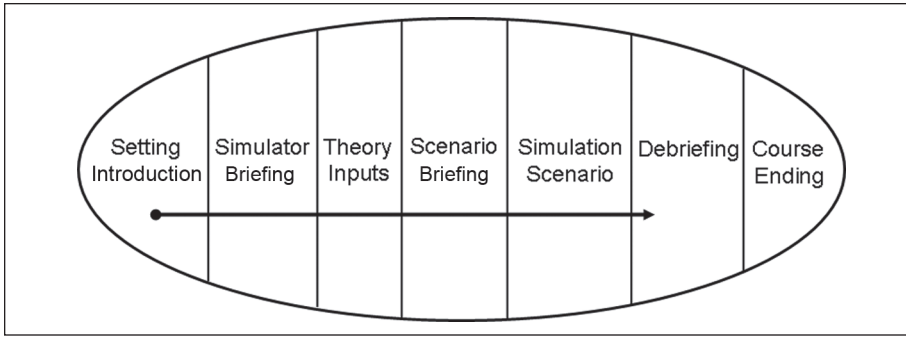

Figure 1. A model of the simulation setting
Note: Adapted from Dieckmann (2009).

Dieckmann, 2009; Eppich, Howard, Vozenilek, & Curran, 2011). Several scholars have described simulation as *social practice* (Dieckmann, 2009; Johnson, 2004, 2009; Kneebone et al., 2006; Laucken, 2003; Rystedt & Lindwall, 2004). Dieckmann developed a model, the setting model, which captures the relevant factors in simulation-based courses in health care. The model proved to be of value for describing simulation practice in a process-oriented way in a previous study in Germany and Switzerland (Dieckmann, 2009). Furthermore, the model is generic enough to be applicable to simulation-based courses in a variety of domains. The model discriminates between seven different prototypical modules (or phases) in a simulation-based course (Figure 1).

1. In the *Setting Introduction*, at the start of the course, a learning environment is created and the simulation-based course is explained.
2. During the *Simulator Briefing*, participants familiarize themselves with the simulator, the related equipment, and the environment.
3. In *Theory Inputs*, concepts and their relationships related to the course are presented.
4. *Scenario Briefings* provide the participants with information about the particular scenario that they are about to join.
5. *Simulation Scenarios* serve as experience episodes that are analyzed during the next two phases.
6. *Debriefings* is often a video-assisted group discussion of the scenario.
7. During the *Course Ending*, the course is finalized, evaluation of the course is performed, and, in some courses, individual learning agendas are sketched.

These modules are essentially prototypical. Their order and number can change, and not all modules are given in all courses (e.g., theory inputs are optional for many courses or could be included between some scenarios). The arrow (Figure 1) indicates that the modules influence each other. For example, the attitude, displayed in the

setting introduction, may influence how openly and actively participants reflect during debriefing.

Research Question

Our *research question* was as follows:

> How do simulation educators see the process goals, the success factors, and the barriers in health care simulation-based courses?

We aimed at *qualitatively* distinguishing different types of process goals, success factors, and barriers. We did not quantitatively analyze how widespread they can be found. We use the term *educator* to refer to the person who teaches in simulation-based courses and whom we interviewed in this study. We use the term *participants* to describe the people who take part in a simulation-based course, led by the educators.

Method

Setting

The study was conducted at Danish Institute for Medical Simulation (DIMS), a large European simulation center. DIMS is a regional center located at Herlev Hospital, Copenhagen University Denmark. The center conducts postgraduate simulation-based training for health care professionals (e.g., physicians, nurses, midwives, paramedics) and undertakes related research activities. The courses are focused on technical medical issues and on issues of communication, leadership, and cooperation, at different levels of complexity. Courses are mandatory for certain target groups (i.e., residents in anesthesia training), and voluntary for the others. At the time of the study, approximately 10 internal educators and approximately 150 associated educators were actively teaching in DIMS courses for approximately 7,000 participants per year. Internal educators are employed full-time in DIMS, whereas associated educators are employed mainly in clinical practice and work part-time in DIMS as educators. All educators follow a formal facilitator training, where they take part in a 3-day basic course and then undergo an apprenticeship-style further education until they run their own debriefings or courses.

The study was in line with the human subjects' protocol of Herlev Hospital, and written informed consent was obtained from all participants. Danish law exempts this type of research from ethical board approval as no patients were involved in the study.

Sample

A convenience sample of seven educators, either nurses or physicians with different levels of experience, participated in the study. Three novice/associated educators took part in the study—young physicians, associated with DIMS for 18 months to 2 years for a single type of course. Two competent/associated educators were specialist health care professionals associated with DIMS for more than 2 years for various types of courses. Two experts/internal educators were specialized health care professionals working with simulation in DIMS for approximately 10 years in different kinds of courses. The sampling aimed to capture the perspectives of typical educator groups in DIMS. Representatives of those groups were invited through asking the first representatives of each group who came to the center to run a course. After being informed about the voluntary nature of the study, all persons invited agreed to participate.

Interview Structure and Process

In the introduction, a standardized set of diagrams was used to explain the background, the overall aims, and the methods of the project. The interviewer also answered questions that the educator might have. The interview itself had three phases (Table 1).

1. In the first phase, questions about demographics were used as icebreakers. The interviewer asked whether the educators agreed in general that the different course modules of the setting model described typical courses. The first phase was ended by asking for the overall, high-level goals of using simulation in education.
2. The second phase followed the modules in the simulation setting model described above. This phase was based on the Critical Incident Technique (CIT; Flanagan, 1954). The CIT is a half-structured interview method that aims at getting a subjective report about a given topic (the so-called critical incident). Interferences from stereotypical points of view are minimized by focusing the interview partners on concrete experience episodes (the critical incidents) in as much detail as possible. A critical incident, as defined by the CIT, is every experience episode, good or bad, that deviates from regular practice and leaves the corridor of events perceived as regular. In the present study, the positive and negative examples of the conduct of a setting module are considered critical incidents. The interviewer emphasized that the interviewees should focus on concrete experiences and personal opinions, and describe those in as much detail as possible. The procedure was repeated for all seven modules. The interviewer encouraged the educators to jump between modules if more details came to their mind. During the interview, a diagram illustrating the seven modules within the simulation setting, similar to Figure 1, was shown.

Table 1. Interview Phases and Questions

Phase I	What courses did you participate in, as an instructor here in DIMS? Do you agree with "The seven modules within a simulation setting" as describing a typical course? What is the overall goal of using a full-scale simulation in medical teaching?
Phase II	What is the goal of this [setting module]? Why are you doing it? Please tell me about an example in which the [setting module] was very successful, please be as concrete and give as many details as possible. Please tell me about an example in which the [setting module] was not at all successful, and again, please be as concrete and detailed as possible.
Phase III	Have another look at "The seven modules within a simulation setting." Did we forget something? Do you have something to add?

Note: DIMS = Danish Institute for Medical Simulation.

3. In the third phase, the educators were invited to add anything that they thought was missing and relevant. The interview structure followed the procedure described by Dieckmann (2009). The interviews lasted between 75 and 110 minutes and were audio/video recorded. The first interview was seen as a pilot interview, after which the procedure should be reviewed and adapted as necessary.

Data Analysis

The interviews were transcribed verbatim from the audio/video recordings. One author (SMF) sorted the quotes of each interview initially into a three-column table that was organized into process goals, success factors, and barriers, for each setting module, yielding 21 tables. The link between the quotes and the interviewed educators were preserved. All citations were paraphrased to achieve a generalized statement. Table 2 shows examples, translated into English. In the final analysis, all the paraphrased descriptions of goals, success factors, and barriers were collected from each module and sorted in accordance to semantic similarity. Headings for each cluster were generated, and again, all paraphrases were reread and checked for correspondence to the cluster. The original quotes were reread by one author and compared with the heading to ensure that the meaning of the quote was preserved. The final clusters were discussed and subsequently refined by the research group until agreement was reached. We did not calculate any measurements of interrater agreement as we are not aiming for a quantitative analysis, but wanted to distinguish qualitatively the different phenomena from each other.

Results

In this section, we describe how the seven educators' responded to the questions. We present the responses here in a generalized form; the details are provided in Tables 3

Table 2. Examples of Interview Quotes and the Analysis Process

Original translated interview quote	Paraphrases	Heading
Example 1: **Overall goal** of using patient simulation in health care education		
The goal is to link the theoretical knowledge of the participants to their clinical everyday life. To bring the individuality out in the open in order to give the participants an opportunity to see for themselves how they work. Not technical skills. But the fact that clinical guidelines can be applied to reality.	To adapt and apply theoretical knowledge to practical knowledge/know-how. To present a perspective to the participant of their professional identity.	Transformation of theoretical knowledge into practical know-how. Shaped professional identity, with high motivation and job satisfaction.
Example 2: **Success factors** in the **setting introduction**		
Hearing about participants expectations of the course and their background—especially, if I do not know the participants beforehand, or if the course is in English and also to signal clearly that this is a course in which one should be active and say something.	Ask the participants to express their expectations about the course and their background in order to signal active participation is expected on this course.	The educators are active in involving the participants.
Example 3: **Process goals** in **debriefing**		
To help participants to reflect on what happened during the scenario, what did I do well and where do I have possibilities for improvement?	To help participants reflect on their professional practice.	Provide feedback.
Example 4: **Barriers** in **debriefing**		
Participants speak about other participants in a mean way.	Participants attack other group members.	The atmosphere is intimidating.

Note: The quotes are translated from Danish.

through 9. We found emerging patterns of differences between the novice educators on one hand and the competent and expert educators on the other hand. Our small sample does not allow for strong conclusions in regard to those differences; therefore, we describe those differences in a hypothetical way.

After conducting the first interview, the procedures were reviewed, but no changes were considered necessary. Thus the procedure was used in the next interview, and the pilot interview was included in the analysis.

Table 3. Process Goals, Success Factors, and Barriers in the Setting Introduction Module

Setting module	Process goals	Success factors	Barriers
Setting introduction	Create a positive atmosphere by providing security and confidence loosening up participants presenting the educators and introducing behavioral norms (e.g., talking time)	The educators need to be motivated and enthusiastic actively involving the participants alert and sensitive to participants well prepared take a clear responsibility in leading the course	Barriers for a functional learning atmosphere were described as lack of commitment inactivity among participants stressed or insecure educators participants who are keeping up appearances too diverse levels of competence among the participants time management problems lack of role clarity responsibility problems team/facility mismatches imbalanced expectations due to insufficient information low participants' expectations insufficient workload distribution among educators
	Compare expectations by introducing the program presenting rules for the simulations	Participants need to be motivated and active briefed about educators' expectations of their role	
	Prime participants for course-related theory (i.e., describe the major content of the course)	Elements of a positive atmosphere were close observation of the confidentiality agreement framing errors as positive in the simulation setting facilitating pleasant, secure, open, and personal interactions	

Main Findings

The main findings of our study emphasize the multitude of factors in simulation-based learning environments that simulation educators perceive as influential for achieving the goal of the simulation activity—above and beyond the technical aspects. The educators speak of atmosphere, the need for active cooperation between instructors and the participants, the need to learn how to use the simulator, and the necessity to establish a common understanding of the simulation scenarios' learning objectives and flow.

Interview Phase I

In Phase I of the interview, a wide variety of technical and nontechnical courses were mentioned representing the majority of the courses conducted at DIMS. All educators

Table 4. Process Goals, Success Factors, and Barriers in the Simulator Briefing Module

Setting module	Process goals	Success factors	Barriers
Simulator briefing	Create a learning environment by establishing an emotionally secure environment, increasing confidence and taking away "stage fright" explaining the overall learning objectives for the simulations clarifying the expectations for the simulations and the roles the participants will be asked to perform Explain the use of the simulator and the environment by explaining the room and he equipment to the participants emphasizing and enhancing the resemblance to participants' clinical life acknowledging differences between simulation and the clinical setting, in order to help participants respond as they would in their normal work	Evidently safe and secure environment, where the simulator briefing is adjusted to the participants' needs and participants trust that they can cope with the simulation situation Simulator briefings should activate participants by relating the current to prior simulation experience encouraging participants to actually touch and test the simulator running a short trial scenario	The barriers to the simulator briefing were insufficient briefing the rules and/or focus areas are unclear technical problems dominate Negative atmosphere participants are reluctant to indulge in the simulation. Time pressure, when the simulator briefing takes up too much time (e.g., because of too many questions)

saw the modules of the simulation setting model as suitable to describe the structure of simulation-based courses. It was, however, mentioned that the model lacked breaks. The educators who made that point argued that breaks are important for the group dynamic and networking. It was further mentioned as essential that the as essential that the sequence of the modules are planned, for example, the relevant theory inputs are performed before the simulations.

As overall aims for simulation-based courses, the educators mentioned improving patient outcome, transforming of theoretical knowledge into practical know-how, improving retention of learning, and developing professional identity, motivation, and job satisfaction.

Table 5. Process Goals, Success Factors, and Barriers in the Theory Inputs Module

Setting module	Process goals	Success factors	Barriers
Theory inputs	Enhance learning by brushing up theory and known concepts presenting new theory and concepts ensuring a common theoretical foundation within the group presenting a different perspective using the theory linking theory to practice (e.g., practical pitfalls while implementing a certain treatment) focusing on learning objectives Secure the existence of the educational institution by justifying the course making the course logistics work	Create a fruitful learning atmosphere in which the participants are active in adapting the theory the educators are well prepared and committed and the theory is relevant to the course, to the clinic, and in general Using teaching methods in which theory is presented in cooperation with participants difficult theory is fragmented and related to existing knowledge an appropriate amount of humor is applied the volume (e.g., number of slides) of information is appropriate the time frame is presented and observed	Barriers for the theory module are presenting irrelevant theory (i.e., out of the focus of the course) participants do not understand the concepts presented (e.g., because of jargon) a mismatch in complexity (too elaborate or too simple), or unawareness of incompetence unprepared and/ or de-motivating educators participants who fail to engage

Interview Phase II

In Phase II of the interview, the educators described process goals, success factors, and barriers, for each simulation setting module (Table 3-9).

Process goals. The educators formulated the process goals partly on the level of the educational process (e.g., explain the simulator and its use, comparing experiences, linking theory to practice, directing attention to learning goals) and focused partly on the learning outcome that should be achieved, such as ensuring common theoretical foundations within the group, creating an insight-full experience, and recognizing areas for further development. In the first instances, the educators described what they or the participants did (the activities); in the latter instances, they focused more on the effects that these actions had (the value). In tendency, the novice educators focused more on the activity, while the competent and expert educators focused more on the value. A further tendency in the answers of the novice educators was to focus on "helping participants to link theory to practice," while the goals of the competent and expert educators tended to be broader—"trying to help participants discover their own areas of development."

Table 6. Process Goals, Success Factors, and Barriers in the Scenario Briefing Module

Setting module	Process goals	Success factors	Barriers
Scenario briefing	Get participants ready for simulation by distributing roles to participants helping participants get in the intended mood helping participants understand the setting and the circumstances of the upcoming simulated case they are about to join directing attention to the learning objectives	Educator ensures a secure environment by introducing staff allocated to the scenario giving well-planned information, sufficient for the participants to join simulation checking for possible uncertainties Educator distributes roles, taking into consideration the aim of assigning a role to the particular participant (e.g., activating the person) assigning roles resembling participants' professional roles the most introducing the roles in a comprehensive way Educator is clear and precise in stating the learning objectives giving a history and a personality to the simulated patient clearly announcing the start of the scenario The participants are engaged in their roles have associations to and experiences similar to previously experienced clinical situations based on the scenario briefing	The educator and/or the facilitator are unprepared and defocused, which could be related to insufficient information provided the participants being unfamiliar with their role the simulation room being disturbed and interrupted frequently The participants do not follow the concept they take over the scenario by acting in ways that were not anticipated they are absentminded they are dominated by performance anxiety they are unwilling to participate

Success factors. The educators described a multitude of success factors. In summary, success was described as stemming from the interplay of human beings with their states and traits (e.g., motivated, active, willing to learn), the technology (e.g., functioning devices, relevant material, suitable scenarios), and the organization (e.g., time for preparation and conduct of the simulation setting). The success factors were partly formulated in terms of activities (e.g., chunking difficult concepts, assigning roles to participants, reflecting on the experience) and partly in outcome-based terms (e.g., participants understand and use theory and concepts presented in the course, enacting roles, deepening understanding). Many success factors were linked to the emotional

Table 7. Process Goals, Success Factors, and Barriers in the Simulation Scenario Module

Setting module	Process goals	Success factors	Barriers
Simulation scenario	Increase awareness of personal competencies and qualifications by creating an insightful experience making participants react as naturally as possible producing an experience episode for the debriefing testing applying theory in practice	Participants should be active and buy into the scenario forget that they were "just" simulating forget about the facilitator become aware of competencies and areas for improvement experiment, using new knowledge and/or understanding obtained through theory and/or feedback work systematically The educator and operator should be attentive and adjust the scenario to fit the participants know the scenario in detail The scenario works as intended technically (simulator and audio/video) in terms of the planned scenario	Barriers are that participants are afraid of embarrassment (e.g., when they are afraid of not being able to implement the correct treatment) do not engage in the simulation cling to and involve the educator in the simulation Participants do not learn because of mismatch of challenges and competencies or unclear purpose or goal for the scenario or course Mishaps due to technical problems or due to insufficient planning and preparation

side of simulation (e.g., avoiding embarrassment), group dynamics, and relationships between educators and participants or among the participants themselves (e.g., turning conflict into learning experiences, creating a safe atmosphere, activating participants, recognizing and dealing with uncertainties). Other success factors were related to making the simulation scenario meaningful to the participants. The educators mentioned that it was important to help participants gain the necessary competence in using the simulator (e.g., actually touching the manikin and to understand its limitations) and to run relevant scenarios (e.g., providing sufficient information, assigning and briefing roles). In addition, the technical side was mentioned in terms of the simulation and other equipment, especially the audio/video recordings.

Barriers. Many of the barriers mentioned by the educators are basically the opposite of the success factors (e.g., time pressure). They reflect a dysfunctional interplay between the human beings involved (e.g., little motivation, lack of knowledge,

Table 8. Process Goals, Success Factors, and Barriers in the Debriefing Module

Setting module	Process goals	Success factors	Barriers
Debriefing	Promote reflection and learning, offer emotional support to promote self-awareness of personal and professional knowledge by engaging participants with providing and receiving feedback providing an opportunity to compare to other professionals recognizing areas for further development	Participants ideally recognize personal learning objectives recognize personal competencies sense personal improvement experience their effect on the group outcome link their reflection to their clinical reality Supportive dynamics and enhancement of learning, by everyone being active, offering different understandings or perceptions to each other an atmosphere that is dominated by mutual respect turning conflicts between group members into positive learning experiences focusing the group on the learning objectives as well as on learning possibilities a group that acknowledges the value of the learning experience The facilitator works as a catalyst for adhering to the debriefing structure posing questions that encourage reflection showing relevant video clips letting the participants do the majority of the talking helping the group move to a higher level of understanding	Participants do not reflect are passive are afraid of speaking up in the group lose confidence feel infallible and overestimate own performance, and perceive the video clips of the scenario differently than intended (e.g., as a threat) The atmosphere is dominated by a shame-and-blame attitude a single participant to whom all attention is drawn The facilitator fails to follow the debriefing structure or is not attentive or does all the analysis himself or herself Mismatch between time frame and content

mismatch in the mutual expectations), technology (e.g., technical failures, problems during the planning, and conduction of scenarios), and organization (e.g., too little time for the preparation, lack of curricular preparation of the course with an overload of content, unequal workload in the educator team). The barriers mentioned derive partly from the preparation of the course, even if the actual problem might manifest

Table 9. Process Goals, Success Factors, and Barriers in the Course Ending Module

Setting module	Process goals	Success factors	Barriers
Course ending	Termination of course by helping participants out of the course catching up on any deficiencies evaluating the course participants producing individual learning curricula	Positive atmosphere happy and satisfied participants and educators participants who feel they have learned a lot participants and educators are commented for their active engagement Participants and educators are active in dialogue and discussion in filling out and collecting evaluation forms Focus on individual future learning prospects participants mention several issues they want to continue working with key points of the course are emphasized plans for how the learning process could continue are made educators have their own evaluation after the course Time schedule is observed being ahead of timetable groups reconvene simultaneously or ending is held in the simulation groups	Atmosphere related barriers unconstructive discussions issues come up that should have been dealt with earlier participants feel the confidentiality has been neglected no connection between participants and educators no one takes responsibility for leading the ending Low activity among participants and educators everyone is eager to leave participants are apathetic and quiet Time is up and no learning prospects are recognized

itself during the course (e.g., unrealistic expectations about the simulation, which participants formed based on precourse material). Again the emotional side and the atmosphere were emphasized as barriers. If either the educator or the participants were unhappy, it was seen as a barrier for reaching the aims of the simulation course. The novices emphasized their own experience more than the other educators, describing it as a potential barrier for them if the participants had higher health care expertise than themselves, or if they felt insecure.

Interview Phase III

In Interview Phase III, all educators agreed with the basic structure of the simulation setting. One reemphasized that the educators' ability to show enthusiasm, yet remain calm and in control, was imperative.

Discussion

In this section, we discuss the results of the interviews in terms of their content, their relevance for creating simulation-based learning environments, and the methods we used for data collection and analysis. The aim was to distinguish among phenomena and patterns of perception and thought. The methods that we used did not allow us to rank the phenomena and patterns in their relative importance. However, the results allow us to enrich our perspectives on simulation on a process level and serve as a cognitive aid for preparing and running simulation-based courses. Although the study was conducted in health care, they are relevant also for other domains using simulation. We will discuss those connections in the end of the article.

Simulation as Complex Sociotechnical Endeavor

The wealth of the process goals, success factors, and barriers described above, which involves both human beings and specific content, highlights the fact that the educational use of simulation is a complex sociotechnical endeavor. This idea is in line with our own previous work (Dieckmann, 2009; Dieckmann et al., 2007) as well as that of others (Curran, 2008; Issenberg et al., 2005; Johnson, 2004; Rystedt & Lindwall, 2004). Although the performance of simulation technology obviously plays an important role, our results emphasize how necessary it is to consider broader factors in order to understand the educational *qualities* of simulation, both within single setting modules and in their setting (Alinier, 2010; Dieckmann, Lippert, Rall, & Glavin, 2010). Although the results do not constitute a strict test, they empirically support the setting model (Dieckmann, 2009) and the inclusion of a variety of interrelated modules in simulation-based courses. The educators in our research acknowledged the relevance of the different modules and the connections among them. We therefore need to attend to the interconnected phases in the model: during curriculum-, course- and scenario-design and implementation, as well as in simulation-educator training.

The Emotional Side of Simulation and Other Frames of Reference

The educators in our research emphasized personal motivations and positive emotions—their own as well as the participants'—as relevant for simulation-based education. Much energy goes into creating, nurturing, and maintaining a positive atmosphere. Many techniques were described to reach this. The rationale was built on the assumption that simulation was challenging for participants, and that their involvement was highly active, so much so that we needed to provide a cushion. This emphasis on positive emotions in simulation might also be understood from a personal perspective. If everyone enjoys the experience, the educators might also feel secure and not need to worry about meeting resistance or getting into arguments with participants. Hence, the course will be highly appreciated by the participants.

However, one might also ask whether a learning environment can be too safe, too cozy, with insufficient challenge. When does a positive atmosphere lead to collusion between educators and participants so as not to disturb the peace? Where and when are challenges not taken up in order to maintain an appearance of agreement? Learning, especially when it touches intimate aspects of the person—issues of professional self-image, core competencies, and long nurtured beliefs—might not always be fun. Such fundamental learning might be related to (temporary) frustrations, doubts, and unpleasant emotions that are incompatible with fun. If we assume that essential ingredients of experiential learning are disturbances and questioning what was taken for granted, then the resulting frustration might be an important vehicle for competence development. The challenge that all professional educators and trainers face shows up here as well, balancing a nice and cozy learning atmosphere with reasonable challenges to make improvement and go beyond the comfortable status quo (Brockbank & McGill, 2007).

Educator Development

The discussion so far underscores the need to include many different aspects in the development of simulation educators. Relevant content expertise, skills in designing and running scenarios, and training and facilitation techniques are needed. The issues mentioned in the interviews, however, reach far beyond this technical level; they cover a variety of areas of personal and professional development, involving elements from such diverse roles as trainers, educators, coaches, and mentors. The picture that the educators described comes close to the ideal human being, with almost supernatural patience and ability to motivate people—as well as participants who are highly intrinsically motivated. The actual simulation practice might look different at times, with people acting in a halfhearted way, with less than perfect techniques, and maybe impacted by extraneous life worries. Educators need self-reflection and professionalism to facilitate the use of learning opportunities by their course participants (Kolb & Kolb, 2009).

Educators need to balance a structured implementation of educational events, achieving a balance between the needs of a prescribed curriculum and the individual learning needs of the participants. For example, although the learning objectives for a scenario must be clearly defined, it should also be possible to adapt them to a group of learners or even individuals. The goal needs to be the educational value of using simulation by creating, recognizing, and using learning opportunities, thus going well beyond a mechanistic implementation of teaching techniques. Facilitators thus need to learn to direct their attention to participants and be present in the here and now of the course. One way to achieve this is to consider the question “what if . . . happened?” during the design and conduct of a simulation course and scenario. A greater understanding of the process goals, success factors, and barriers within the setting phases and in their interaction will help simulation educators to become flexible in their roles and to adapt to learners’ needs.

Influences From the Outside:Time Pressure or Content Overflow?

As the major conceptual challenge, all interviewees mentioned the strict time frame and (too) little time for single modules. Such time pressure issues can be seen as a natural consequence of the wealth of topics relevant for simulation and patient safety. In designing simulation-based courses, which encompass both professional-technical issues and human factors issues, we need to avoid the pitfall of including too much, even if the ground to be covered is huge. In addition, participants not only have to learn about the contents of the course and reflect on these, but they also often have to learn how to use the simulator and the simulation environment. Consequently, much discipline is required from the educators to avoid exceeding the given time frame, by adjusting the amount and complexity of contents presented to the learners and the given circumstances. Working within given structures (e.g., briefing checklists, debriefing-guides) can be beneficial to notably novice educators by providing security and orientation. Structures can also help the experienced educators not to go astray while teaching. However, as mentioned above, such structures should be handled flexibly; they need to be seen as a means, not an end.

Discussion of the Methods Used

Sampling

Our sample was based on convenience principles and our sample size was small. We planned some systematic variation (level of expertise in simulation—novice, competent, expert), but encountered confounding factors with professionals (nurses and physicians). The level of health care expertise in our sample was positively related with simulation experience, with the clinically more experienced people also being more experienced in simulation. As our study had an exploratory character, aiming to identify phenomena and processes, not how widespread they are to be found, we think that the bias had a relatively minor impact. In addition, based on the experience with running instructor courses since 2004, we did find much face value in the results, as they describe success factors and barriers often faced by beginners in the simulation-instructor role (Dieckmann, Rall, & Sadler, 2008).

Data Analysis

As with all interview studies, we needed to interpret what the educators told us. One might always question whether the message given by the interviewee was the same as the message perceived by the interviewer. Language, at times, is less precise than one might assume. The interviews were transcribed, paraphrased, clustered, and translated into English and some meaning might have been lost in those translations. The interview is an intersubjective project between two people talking about a subject of mutual interest (Kvale, 1996). The questions, posed by the interviewer, determine

which aspects of a topic the interviewee will address, and the active listening and follow-up to the answers contribute to determine the progress of the interview. Interviewee comments describe what the educators say they do; however, those statements are not always representative of what they actually do (Dieckmann et al., 2009).

Nevertheless, our results elucidate cognitive frames of simulation educators, ingrained in simulation-based health care education. Rationales behind simulation practice become clearer and can serve as a basis for further and more focused reflection and development for this practice—both, for scientists and practitioners.

Future Research

For future research, it would be beneficial to systematically investigate which subgroups of educators might have different views on process goals, success factors, and barriers. Possible dimensions for the search could be professions, experience levels, and target groups of participants (e.g., students vs. professionals). Gaba (2004) has formulated dimensions to describe the diversity of simulation use and those could be useful as well.

It might be helpful to develop a better understanding of the interplay of the factors that were listed in our study and to weigh them against each other in order to identify the most promising areas for improvement. Some of the interviewed educators expressed gratitude for having been a part of the study. They mentioned that the interview and the CIT method had led to new personal insights. In the research group, we were pleased to become aware of the valuable resource of information the interviewees represented. This has made us aware of the possibility of using the CIT questioning method as a tool in educator development. It can serve as both a facilitation of the individual educator as well as a needs analysis for a further curriculum for educators. Future research could investigate the feasibility of implementing this approach for simulation-educator development.

Conclusion

In this study, we described process goals, success factors, and barriers for conducting modules of simulation-based courses with the overall aim of increasing patient safety. The interviews with simulation instructors of varying experience levels demonstrated that the success of simulation-based learning depends on the functional interplay among the humans involved, the equipment that they use, and the organizational framework in which the simulation setting is embedded. Our results point to possible optimizations in simulation practice. The harmonious and beneficial integration of simulation courses into the curriculum might include adjusting the amount of content that needs to be covered, optimizing the various interdependent parts of simulation-based courses, focusing on the value of creativity, recognizing and using learning opportunities as they arise (instead of a mechanistic implementation of teaching techniques), and helping simulation instructors both to acquire the skills they need and to

clearly define their roles. Our interviews shed light on why exactly simulation education works (or fails to). Our results emphasize the need to strengthen further the theory-based analysis and optimization of simulation practice.

Acknowledgments

We thank the initially anonymous, then coaching reviewers, Guillaume Alinier, Jeffrey Lennon, Nicolas Szilas, and Simon Edgar for helpful feedback and suggestions for improvements on previous versions of this manuscript. David Crookall helped with inspiring discussions and feedback to sharpen and improve our text.

Declaration of Conflicting Interests

The authors declared the following potential conflicting interests for the research, authorship, and/or publication of this article: The Danish Institute for Medical Simulation (DIMS) has a collaboration agreement with Laerdal, a manufacturer of simulation manikins. DIMS is part of the EuSim Group, providing simulation instructor courses.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was funded by institutional funds of the Danish Institute for Medical Simulation (DIMS).

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