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On the bridge to learn: Analysing the social organization of nautical instruction in a ship simulator

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Abstract Research on simulator training has rarely focused on the way simulated contexts are constructed collaboratively. This study sheds light on how structuring role-play and fostering social interactions may prove fruitful for designing simulator training. The article reports on a qualitative study of nautical students training in a ship simulator. The study examines how a group of students, together with a professional maritime pilot, enacted professional roles and collaboratively constructed a simulated context for learning to navigate. Their activities on the bridge were framed within the maritime profession's hierarchical system of captain and officers, and we examine in detail how these institutionally defined positions become important resources for meaning-making during role-play. The article portrays how two competing activity contexts were constructed, and how the role-play provided opportunities for enacting professional roles and work tasks. However, it also shows that it is challenging to pick up on what is significant to learn and to confront this in debriefing. The article concludes that the students' collaboration and meaning-making is an entity of training that may be more efficiently addressed.

Keywords Simulator training · Role-play · Activity contexts · Simulations · Interaction analysis

Introduction

In this article, we provide an analysis of how a group of students participate in training on a ship simulator, and we examine the ways in which they enact the institutional roles and activities of their profession through role-play. The simulator combines the designed physical space of a ship's bridge with digital projections of ships at sea. We are particularly interested in examining how the students jointly

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coordinated their actions in terms of what was expected of them as future expert crew members, as well as the meanings and functions of tasks, resources, and environments as they emerge through the professional practices in which they engage. The activities on the bridge are framed within the maritime profession's hierarchical system or division of labour among captain, maritime pilot, and officers. We analyse ways in which these institutionally defined positions, together with the simulator's technological tools, become important *resources* for meaning making. We further examine, in detail, how this enactment of professional roles enables some opportunities for situated actions that are close to those on a real ship.

To address this topic, we collected data from ship simulator training that is part of a bachelor's degree programme in nautical studies at a Norwegian university. Simulators are customary in nautical studies in Norway; they are used for connecting school theory and work practice, and for practising navigation in a safe environment. The learning activities comprise both isolated training of specific navigation skills on desktop simulators and students' exploration of the dynamics characterising a bridge environment. Hollnagel defined simulators as "a representation of certain features of a real environment to achieve some specific objective" (2011, p. 80). Many different simulators and ways of simulating practice on ships are used to provide learning experiences in nautical studies, from desktop simulators and plain role-playing to immersive tools such as the full-mission bridge simulators studied here.

Simulator training is considered a central strategy for improving maritime safety. Prior research within the cross-disciplinary field of simulator training has studied levels of fidelity and learning (Alessi 1988; Vincenzi et al. 2009), simulator training of crew resource management (Salas et al. 2006), the significance of debriefing (Fanning and Gaba 2007), and social aspects of how simulator activities need to be contextualised and learning to simulate needs to be part of training (Rystedt 2002; Rystedt and Sjöblom 2012). The following analysis focuses on the simulator activities as a situated activity system consisting of technological, cultural, and physical entities that together create a simulation. We provide detailed analysis of such activity. This article discusses potentials for learning by enacting professional roles, and introduces Linell and Persson Thunqvist's (2003) concept of activity contexts as a resource for describing how enacting institutional roles shapes the simulator activity. To our knowledge, role-playing as an important part of ship simulator training has not been analysed before.

The simulator exercise portrayed in this article involves three students 'sailing' a cruise ship towards Oslo, from the outer end of the Oslo Fjord. Entering these waters requires a maritime pilot on the bridge for guidance, and this exercise is out of the ordinary, because a visiting professional pilot takes part in the scenario. Analysing video data from this exercise, we focus specifically on situations where students' actions were supported by experts and teachers, and situations where their role-play encountered obstacles. This professional guidance makes the exercise particularly interesting, for several reasons. First, we might expect that it adds realism to the scenario. Second, it is also probable that some issues regarding the simulated scenario and real work practices are more apparent with a professional participating. Furthermore, it is interesting to study how the pilot's professional expertise is made visible and perhaps taken up as a resource for learning.

What and how the students learn in this exercise are deeply entwined, and these multilayered aspects of simulator practices are made evident when answering the following research question:

How do students' enactment of professional roles and construction of relevant activity contexts in a ship simulator environment offer opportunities for learning and instruction?

To analyse how this professional practice becomes visible and learnable, we pursue a socio-cultural approach to human practices, with particular emphasis on ways that knowledge becomes visible in and through social interaction, as well as how social action is mediated by cultural tools (Bruner 1996; Engeström 1987; Koschmann 1996; Lave and Wenger 1991; Vygotsky 1978). Within this background, Computer-Supported Collaborative Learning (CSCL) is a relevant field of study, as it is centrally concerned "with meaning and practices of meaning making in the context of joint activity and the ways in which these practices are mediated through designed artifacts" (Koschmann 2002). The manner in which participants construct the simulator as an environment for learning and developing professional expertise requires us to be sensitive to how the environment is constituted as a context for learning (Goodwin 1995; Lave and Wenger 1991; McDermott 1977). Participants' actions are perceived as meaning-making activities for joint conception of their doings and as processes of constructing activity contexts (Linell and Persson Thunqvist 2003). Creating activity contexts concerns issues of recreating a work-like environment, as well as utilising this environment for learning and instruction.

The article is organised as follows: first, we introduce the background of educating seamen and the use of ship simulators, and provide an account of the theoretical and analytical perspectives that informed the study. Then, we introduce and discuss methodological issues. Finally, we present an analysis of selected extracts from our corpus of materials. The four extracts display important parts of a specific training session, and these sequences demonstrate how a simulated activity context was created. The first extract shows how a simulated context for action is established through role-play. The second extract shows how shaping a realistic role-play involves considerable effort and may come into conflict with other objectives for training, such as meta-reflection and asking for help. The third extract shows how the students' role-play creates an activity context for enacting situated work tasks. The fourth and final extract shows how debriefing contains significant potential for connecting immediate action to general rules and principles; however, this scenario also reveals students' difficulties with seeing the complexity of their simulated actions. In the discussion section, we draw together the main findings and point out the key aspects of the simulation practices identified here that might point towards creating successful training in a more general scope.

Ship simulators as tools for learning

Traditionally, shipping has been a cornerstone of Norway's economy, but massive 'reflagging'—registration of ships abroad for tax reasons—and the hiring of foreign labour have radically altered the working conditions of Norwegian ship officers. Working on ships has traditionally been a high-status occupation, but today, it is no longer a profession with a strong appeal among teenagers. However, the educational institutions offering maritime studies seem well functioning and are characterised by a relatively small dropout rate among students. This tendency may have several explanations; however, according to a recent report on maritime education, the teaching strategies—with extensive use of simulators—and close integration with practice are important factors (Brandt 2008).

Research on simulator training and simulated activity is cross-disciplinary and not easily summarised. This review will briefly point out some important aspects of research that have informed this study in various ways—i.e., *human factors* research, notions of *fidelity* within research on simulator training, and detailed studies of *simulated interaction*.

An important background for training in ship simulators concerns meeting aims for safer shipping, especially as identified within the cross-disciplinary field of 'human factors', which investigates human performance in technology-saturated environments (Vicente 2006). Data on ship accidents show that human factors are directly associated with 70 % of the accidents in the USA, the UK, Canada, and Australia (ABS 2004). Ship simulators provide opportunities for practising ship handling, bridge team communication, and responses to unexpected incidents; within human factors research, there are several studies on simulator training for bridge operation. These studies tend to focus on division of labour, identifying teamwork routines, and behavioural markers related to risk factors (Barnett 2004; Barnett et al. 2006). Many of the educational practices in the maritime domain are oriented towards certifying courses, such as crew resource management training (CRM). Such training focuses on team collaboration and relies heavily on simulator training. CRM training shows some positive results, but it struggles in some aspects, especially with assessing learning outcomes and further connecting CRM training to improved safety (Salas et al. 2006).

Usually, simulators are used for training skills that involve considerable time, cost, and risk to practise in natural settings. Simulator training provides risk-free training for critical situations, such as accidents. It also provides opportunities to repeat and organise activities in a manner that is not possible in actual work settings, such as opportunities to 'freeze' scenarios for discussion or instruction. Organisers of simulator training often put much effort into debriefing, meta-reflection, and scaffolding in the forms of instructor, peer, or technological support. Debriefing is commonly advocated as a crucial aspect of simulator training (Fanning and Gaba 2007; Vincenzi et al. 2009). Baker et al. (1997) point out that debriefing sessions may be employed to *transform experience into learning*.

Human factors research on ship handling often stems from cognitive perspectives on learning, and the analytical concepts and metaphors used to describe learning are often functional to this background (Hollnagel 2011). This is recognised in the educational objectives of isolating skills for training (Alessi 1988), schemas of shared understanding of vessel state and navigation path, such as 'situation awareness' (Endsley 1995a, b), or metaphorical descriptions of mental structures, such as the 'shared mental model' (Mathieu et al. 2000). Hollnagel (2011) claims that there has been a change within human factors research, from the understanding of human–computer interaction as two 'parts' interacting through mediating processes, to the perspective of distributed cognition where participants and artifacts are understood as co-constructers of meaning. However, this review did not locate detailed interaction analysis on simulators within this research domain.

A key theme of interest in simulator research is how fidelity relates to learning. Fidelity refers to "the degree of exactness with which something is copied or reproduced" (Fidelity n.d.). In prior studies of learning in simulators, the concepts of fidelity and authenticity were often used to describe the realism of the simulation (Vincenzi et al. 2009). Fidelity is often categorised as *high* or *low*, depending on how immersive and complex the simulators are (Rehmann et al. 1995). Considering the cost of simulators, there is obvious interest in determining the level of fidelity that enriches specific forms of learning activities. Alessi (1988) found that it is useful to start training newcomers on low-fidelity simulators and introduce them to high-fidelity simulators when they have fulfilled a certain degree of basic training. Many of the studies on simulator

fidelity and learning consider skills acquisition. For example, within healthcare, Brydges et al. (2010) carried out comparative experiments using high- and low-fidelity simulators to practise intravenous catheterization, and assessed participants' global clinical performance, communication, procedure documentation, and technical skills on a transfer test. They created a comparative study of students working on low-fidelity simulators versus high-fidelity simulators and compared these two groups to a third group of students that worked progressively, from learning isolated skills in low-fidelity environments, to mid-fidelity, to more integrated sets of skills in a more global and patient-centred context in high-fidelity simulators. The group that worked progressively from low- to high-fidelity simulators performed best, and it was found that high-fidelity simulators proved most effective in training integrated sets of skills. This may be seen in relation to Alessi's (1988) claim that low-fidelity simulators enhance initial learning and high-fidelity simulators provide environments that support skills that are more complex, such as teamwork and communication. These studies provide important insights into the simulator complexity needed for completing specific work tasks. However, it may also be fruitful to speak of fidelity and authenticity in relation to other aspects of work practice simulations—such as collaborative routines, professional talk and psychological orientations—rather than technological features alone. Such fidelity, however, cannot rely solely on the technological features of the simulator, but should be seen as an interactional achievement. Within CSCL, it is frequently shown how authenticity is created through activity rather than inscribed in the technological environment itself (Dillenbourg et al. 2009; Petraglia 1998).

We have not found interaction analysis of work in ship bridge simulators, but several studies have been conducted within healthcare, aviation, and communication studies. In reviewing detailed studies of interaction, some stand out. Hutchins and Klausen (1996) and Hutchins and Palen (1997) uncover the complexities of cooperative work among professionals in flight simulators. They investigate the distribution of cognitive activity, as well as how joint representations are produced through gestures, gaze, and talk. Their study sheds light on simulator training as a means of exercising professional actions with a high degree of accuracy in relation to actual work practice; however, it does not address the simulated practice as different from the actual work that is simulated.

In contrast, Rystedt (2002) used interaction analysis to see how simulations were used in nursing education. This study showed that the students' framing of the activities was key to investigating their learning processes, and that simulating 'authentic' practice depended not only on the realism of the simulations, but also on the authenticity of the collaborative activities among the participants. Furthermore, Rystedt and Sjöblom (2012) analysed how participants in medical training experience realism, and showed how a simulation emerges among the participants, the simulator, and the context. How the users may treat an isolated part of the simulated scenario as authentic without all the features of the real situation being present was also shown. A crucial feature, however, was the design of appropriate guidance and feedback. Such a focus on situated and social aspects of simulating was also recognised by Rystedt and Lindwall (2004), who identified how three different learning foci were collaboratively established, whilst working with simulations in healthcare vocational training. Their analysis shows that both the students' previous experiences and the teacher's guidance towards different resources became key properties for training. Johnson (2007) studied how participants created contexts for situated learning of medical practices while using a simulator that enables training of minimally invasive surgery techniques. It was shown that significant effort is demanded from the participants to put their training

of isolated skills to use, and that forms of apprenticeship become important elements for situating decontextualised skills in medical practices.

There have been several relevant and detailed studies of role-play in learning activities that do not include simulators (De la Croix and Skelton 2009; Seale et al. 2007; Linell and Persson Thunqvist 2003; Stokoe 2011). Stokoe (2011) reviews uses of role-play in learning activities and discusses whether 'authentic simulation' is possible. Role-playing for learning is revealed as problematic in several aspects, especially since the participants' interactional contingencies and what is 'at stake' differ from real situations. Further, the article highlights the conversation analyst's micro-perspective on communication as a possible resource for educating professional members of talk-based institutions, by reporting from a workshop series where transcripts of actual dialogues were used for triggering reflection on participants' own professional practices. Linell and Persson Thunqvist (2003) studied simulated job interviews in a training project for unemployed people. They show that these simulated talk activities are complex and are recognised by scaffolding features for the activity to promote learning, such as time-outs and leading questions. At the same time, the studied conversations display some of the complexities and dilemmas of real job interviews. The participants build their utterances to fit a specific activity context—or several at the same time—as they enact role identities corresponding to these activities. This involves both methodological problems for analysing such hybrid talk activities without exploring the whole ecology of communicative activities, and strong support for interactionist views on context as dialogically accomplished in situ.

Similar to some of these closely related studies of simulated interaction, this article employs detailed analysis of simulated interaction and relates this to learning opportunities in a technologically highly immersive simulator environment, which reflects central work tasks within the nautical profession. This will provide insights into the interactional entities of ship simulator training, which is an interesting and scarcely investigated part of ship simulator training.

Analytical framework

This study is grounded in a socio-cultural learning perspective, which offers tools for investigating learning as participation in social practices. This article deals with issues concerning learning opportunities by participating in professional practices, as well as whether such practices may be simulated in sensible ways. The term 'situated' describes how learning is inevitably connected to context, and highlights the way particular social and physical environments combine to shape understandings (Hutchins 1995; Greeno 1997; Lave and Wenger 1991; Middleton and Engeström 1996; Vygotsky 1978). From such a perspective, notions of learning and context are deeply entwined. McDermott (1977) argued that learning environments are developed interactionally, and that social relations create contexts for learning. Hood, McDermott, and Cole pointed out that "people learn about themselves and about each other by the work they do constructing environments for acting in the world. And this is how we must come to know them as well" (1980, p. 158). This implies that creating learning environments requires sensitivity to the ways social settings are created collaboratively by the use of conceptual, cognitive, and physical tools, and that skills and knowledge should be perceived as situated elements of this environment, rather than as material for internalization.

How professional contexts are socially constructed is displayed empirically. For example, Goodwin (1995) analyses research activities on an oceanographic research vessel, and shows

how differently positioned actors use spaces and representational technologies to create a common course of action. This analysis shows how the constituted spaces for conducting enquiry shape the knowledge produced there. Further, Goodwin (1994) analysed archaeologists' and lawyers' ways of seeing and understanding events in a distinctive way specific to their professions, and provided detailed descriptions of how professional contexts for action are constituted. Middleton and Engeström (1996) demonstrated that work tasks are constructed collaboratively; meaning that managing and defining the task collaboratively is key to solving it.

In CSCL, the complexities of institutional shaping of contexts for learning with computers are potentially interesting topics for empirical analysis (Arnseth and Ludvigsen 2006). However, displaying learning in interaction empirically is not easily done. Suthers (2006) outlines a research agenda for CSCL, rejecting the concept of learning as a conceptual resource for analysis when empirically investigating collaborative learning activities with technology, and instead proposing *technology affordances for intersubjective meaning making* as a suitable research agenda. Suthers' working definition of intersubjective meaning making is the "joint composition of interpretations of a dynamically evolving context" (2006, p. 321). Suthers' definition is closely tied to how contexts are managed interactionally and how technology may support joint meaning making. Analysing the joint construction of simulated activity contexts in a full mission ship simulator, and how this relates to opportunities for instruction and learning is, to this background, an interesting case for empirical investigation.

Activity contexts as analytical resources

There are several potentially interesting frameworks for empirically analysing construction of context. Notions of context as socially co-constructed have been claimed by many before us (Duranti and Goodwin 1992; Linell 1998, 2009; Ochs 1979; Schegloff 1991). According to Goodwin and Duranti (1992, p. 3), talk is key in analysing participants' understanding of context and contextualising activities. Talk can create context for the appropriate interpretation of non-verbal behaviour, and talk, in itself, is contextualised by other talk.

Goodwin and Duranti use the term *focal event* to identify the phenomenon being contextualised—in our case, the changing activities and situations that need responding to—and the rest as *background*. According to Goodwin and Duranti (1992), delineating the focal event is the job of the analyst, and when this is outlined, one may apply embedding features of the activity, such as cultural setting, speech situation, and shared background. Relationships between such a conception of context and learning in simulator activity are evident in Rystedt and Lindwall's use of 'learning focus' as a resource for analysing how aspects of context are made relevant by the students for making sense of and acting on the simulated scenarios (Rystedt and Lindwall 2004, p. 170).

It is reasonable to claim that a large number of events have various and shifting foci, and that these conceptualisations are also useful for investigating learning. However, the interactions investigated in this article seem not only a question of handling what Goodwin and Duranti define as a focal event, but also handling significantly different contexts in line with Goodwin and Duranti's outlining of context as a "field of action within which that event is embedded" (1992, p. 3). The analysis of what context the participants of this study make relevant indicates at least two relatively stable contexts that may be identified in the data: the simulated activity of being a professional crew navigating in the Oslo Fjord, and the basic circumstances of being students in a school simulator. To expose this dual nature of the

simulator activities, we employ Linell and Persson Thunqvist's (2003) concept of *activity contexts* as an analytical resource.

Activity contexts, in this article, represent the participants' configuration of contextual resources, closely related to Goffman's (1974) concept of *frame*, but also different in its more stable relation to some environmental and professional aspects—the professional activities the students are engaged in in the simulator. The analysis in this paper considers the construction of activity context as vital to understanding the students' joint performances and the simulator's potential as a learning environment.

Activity context is a contextual dimension that relates to participants solving certain tasks, such as in a court trial or at a doctor's consultation, and it has been used previously for analysing simulated activity (Linell and Persson Thunqvist 2003). Activity context is a merger of activity and context. *Activity type* is a central notion in both discourse theory and socio-cultural learning theory. In discourse theory, activity type is a meso-level linking micro and macro levels of sociological description (Linell and Persson Thunqvist 2003, p. 431). In socio-cultural learning theory, activity conceptualises both the physical and 'mental' interactions between individuals and their surroundings. According to socio-cultural learning theory, the social nature of learning is realised through activity. Activity is a concept that describes the trajectories of social interaction or a series of goal-oriented actions (Engeström 1987; Leontev 1978; Vygotsky 1978). This level of analysis allows an investigation of simulator practices where the participants' enactment of professional work may be evaluated.

The article utilises the notion of activity contexts to avoid the traditional contradiction between physical and cognitive contexts, and narrowing this down to the conceived conditions to act upon. Aiming for a deeper understanding of interaction on 'Cruise Ship Bergen', this may illuminate how joint construction of activity contexts by enacting professional roles affects opportunities for learning. Activity contexts are used as an analytical concept to identify two competing contexts that are made visible in the forthcoming analysis. Activity context 1: the participants are professional seamen on a ship bridge, navigating through close waters with a local pilot on-board for guidance, which is achieved through role-play. Activity context 2: the participants are students attending a training course at a maritime educational institution, where a professional pilot is participating to show them how cooperating with a pilot might occur on a real ship.

Data and methods

Interaction analysis is a methodological framework for studying social interaction as it evolves through talk, non-verbal interaction, and the use of artifacts and technologies among members of communities of practice. Emerging from ethnography, conversation analysis, and socio-linguistics, interaction analysis is an empirical and interdisciplinary method oriented towards video-based studies of social interaction (Jordan and Henderson 1995).

Video observations allow for tracing trajectories of students' reasoning and doings in the simulator. A significant characteristic of all the simulator sessions observed in this study is regular shifts between talking to each other in the institutional roles of captain, first officer, pilot, and harbour control, and talking more freely as fellow students cooperating to handle the simulator. For this analysis, some key analytical concerns that were pointed out by Jordan and Henderson (1995) are especially relevant: matters of *projectability* concern issues of fostering well-functioning dialogues, and are important for analysing possible conflicting goal orientations for activities. Issues concerning *temporality* and *repair* are relevant for discussing how the simulated activity context is managed and structured interactionally.

Scrutinising *participation structures* is very interesting, both for seeing how the participants play out their future professional roles and for investigating how activity contexts for enacting these professional roles may be simulated. The institutional background for the portrayed activities is key to examining this particular training. The study follows students enrolled in nautical studies. It is a three-year course combined with required practice on-board boats, and it issues the first in a series of certificates for navigating ships. The curriculum comprises lectures, classroom instruction, self-study, group work, report writing, simulator training, and student presentations. In the curriculum, it is also emphasised that *trial and error* is actively encouraged, especially when using simulators.

The portrayed exercise took place in a full-mission bridge simulator where a physical replication of a ship-bridge is placed in front of a 180° projection, as shown in Figs. 1 and 2. The data material for this study is selected from approximately 45 h of video from 15 exercises observed in the time period from 2010 to 2012. One two-hour session was the focus of the investigation in this paper. This session proved to be especially interesting for analysing how the enactment of institutional roles is managed within the group, and how this relates to learning. For the particular simulator session portrayed in this article, a professional maritime pilot took part in the session. The pilot instantly initiated English as the proper work language in the simulator, and this made shifts in and out of role more visible. By critically evaluating the students' role-play dialogues, parts of the material were chosen for transcription and closer analysis. The chosen extracts show instances where the participants move in and out of role-play, and implicitly negotiate whether they should stay in a role or not.

The maritime pilot joined the students for about half the time they were in the simulator. The session consisted of about 15 min of the instructor's presentation of the scenario, 52 min of simulator operation, and approximately 30 min of debriefing. The transcripts are transcribed at a semi-level of detailing, suited for the analytic level of this article (Jordan and Henderson 1995) (see Appendix 1 for descriptions of symbols).

In this specific scenario, the student teams played out a traffic situation outside the island of Bastøy; the simulator, 'Bergen', was taking a maritime pilot on-board to guide the ship up the Oslo Fjord after passing Bastøy. Their main task was navigating through a complex ship traffic situation in the Oslo Fjord, in cooperation with a professional maritime pilot. During the simulator sessions, five groups of approximately three students each worked in a simulator as part of a larger scenario. The video recordings came from the largest of the simulators, called 'Cruise Ship Bergen' in this scenario.

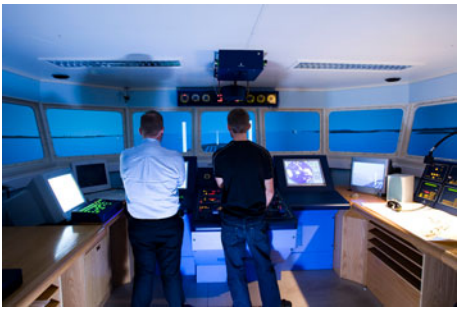

Fig. 1 The full mission bridge simulator observed in this study

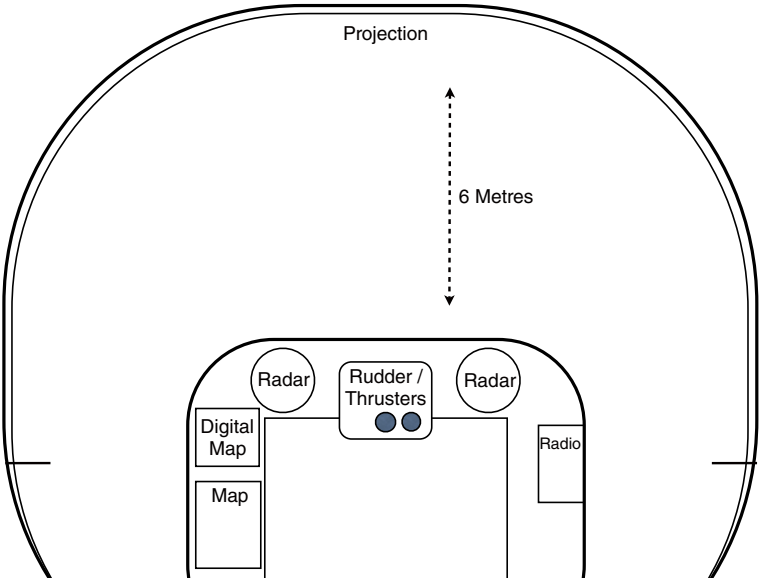

Fig. 2 The simulator layout

1. **Briefing**
   The briefing took place in a classroom next to the simulators. It lasted for about 10 min and consisted of an introduction to the day's assignment, where practical information was given and learning objectives and various resources were shared. Experiencing having a pilot on-board was emphasised as a specific learning objective.

2. **'Sailing' a simulated cruise ship**
   The students were divided into five teams, each assigned to a specific simulator that projected different types of ships with different tasks, but all in the same overall ship traffic situation. They communicated with the instructor (in the role of harbour authority) and the other ships through radio communication. At times, the instructor entered the simulators to see how things were going or to offer help on specific problems. The pilot entered the simulator after 23 min of sailing, and navigated with the students for 30 min. During this time, one of the authors stayed in the control room with the instructor and was able to follow the students' actions on a monitor, as well as hear the instructor's communication and on-going evaluation of the exercise. It was also possible for the authors to watch the students through a window in the simulator.

3. **Debrief**
   The debrief session evaluated and discussed the students' 'sailing'. Sometimes the participants engaged in in-depth discussions about specific actions; at other times, they discussed general issues, such as choices of routes or obstacles in the natural environment of the exercise. An electronic map with a replay of all the ship's movements aided and organised the debriefing.

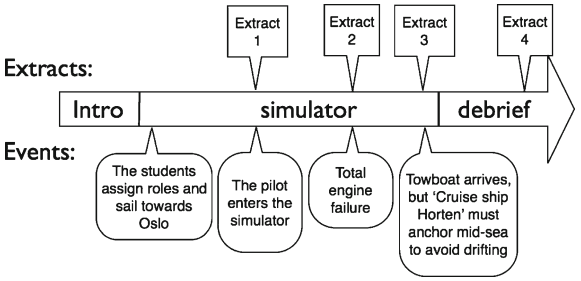

Fig. 3 Outline of the exercise

The following extracts were all collected from one simulator session, and orient towards transitions and negotiations regarding contexts and role-play. The position of the extracts in the timeline of the overall exercise is shown in Fig. 3.

Creating activity contexts by enacting professional roles

In the following analysis, four extracts from the exercise are presented. These show how the participants created a credible role-play (and also activity context) in their first meeting, and how they expended considerable effort throughout the exercise to sustain this role-play. The two latter extracts show how this simulated role-play became an activity context that created opportunities for completing work tasks, and how the students failed to perceive the complexity of these tasks.

Negotiating roles when meeting the pilot

The students met in a classroom for the introduction of the day's assignment and division into groups. When they entered the simulator, they instantly started preparing and planning the journey presented to them. Much of this work involved establishing the ship's exact position and making a solid plan for navigating through the waters ahead. When analysing the students' efforts, it was not easy to recognise the simulator-specific elements in their interactions. For long periods, seeing the students in the simulator resembled what it would look like if they were on a real ship. There were three students on the bridge, and the workload kept them all busy. However, they frequently discussed the overall situation, seeking a joint conception of the surrounding traffic situation.

Approximately 30 min into the exercise, 'Cruise Ship Bergen' would soon pass Bastøy, an island in outer Oslo Fjord, and they were expecting a pilot on-board. In this area, all ships of this size are required to have a pilot on-board to guide the ship to harbour; in the simulation, a computer-generated helicopter—supposedly with the pilot—landed on the front deck.

Prior to the dialogues displayed in this extract, the students' interactions were oriented towards the tasks at hand, but in an informal manner, with the Norwegian language being used. The following extract presents the first meeting between the students and the pilot, and shows how the interactions adapted when the professional maritime pilot entered the simulator. The pilot was a professional visiting pilot, and the captain and his officers were students undergoing training.

Extract 1. (Original language)

1.		((Door opens and the pilot enters the bridge))
2.	Pilot:	Hallo
3.	First officer:	[He:::y] pilot
4.	Chief officer:	[hallo]
5.	Captain:	[hello]
6.	Chief officer:	(hmn)
7.		((Chief officer looks up and nods to the pilot))
8.	Pilot:	This is Oslo havn (.) hallois (.) Captain?
9.		((The first greetings are either in Norwegian 'hallo' or English 'hello'. The chief
10.		officer and the first officer briefly look up from their doings on map and rudder))
11.	Captain:	yeah
12.	Pilot:	yeah, nice to meet you
13.		(4.0)
14.		((The captain and the pilot nod and shake hands, then the captain turns to the
15.		chief officer and reaches out his hand to introduce him))
16.	Captain:	This is (.) e:h (1.8) head officer or?
17.	Pilot:	Chief officer (.) chief officer
18.	Captain:	Chief officer
19.	Pilot:	(hmf)
20.	Chief officer:	<yeah>
21.	Pilot:	(x) Chief officer↓ ((pilot and chief officer shake hands))
22.	Captain:	and this is first officer
23.		((Pilot and first officer shake hands))
24.	Pilot:	↑Oh first officer, nice to meet you (xx) OK (hhh)(0.6) so:: e:h your speed is 15
25.		knots and increasing?

This extract portrays the pilot entering the simulator. From line 2, one may sense a negotiation of proper tone in the simulator. The pilot's first greeting, which may have been understood as an English "hello" or a Norwegian "hallo" by the students, was rather neutral in terms of official tone. Then, the first officer's greeting in line 3 was noticeably less formal than the pilot's first greeting, and was met by a strictly formal response from the pilot that underlined his professional position as 'Oslo havn' (meaning Oslo Harbour) in line 8. This bidding for formal positioning was increased by his request for the captain. It seemed as though this response initiated a role-play where the participants took on professional roles that persisted throughout the exercise. In particular, the pilot's establishment of English as the proper professional language, even if they could all speak Norwegian, caused a noticeable shift in communication once the pilot entered the bridge.

This choice of English as the proper language was under negotiation during the whole session, and it will be displayed further in the analysis. Generally, the students spoke English when 'in role'; when they stepped out of the role as crew on the 'Cruise Ship Bergen', for example, to make meta-comments, they spoke Norwegian. This may be interpreted as a negotiation of relevant activity context, and was especially evident when the pilot entered the ship insisting on using English as the working language. Rather consistently, the use of English signalled an activity context where the participants enacted professional positions and responded to the simulated environment as 'real'.

This shifting between languages created a more significant differentiation between being in and out of roles, and allowed us to further probe issues of role-playing and professional enactments of roles.

In these sequences, it becomes clear that role-play was a key resource for creating the simulation. It was not a role-play in the sense of structured sequences of acting, or exercises where the students were trained and evaluated on their acting. The students, in fact, engaged in neither. Their role-play unfolded as a way of creating sensible contexts for the tasks presented to them, and it was not subject to evaluation by the instructor.

Further, in line 16, the captain introduced the chief officer, but both students were unsure of his accurate title. The captain paused when he became unsure of the title, and the pilot supported him by briefly filling in a suitable title in English, rather than starting a conversation or discussion. This confirmation of proper title went back and forth in lines 17 to 21, and ended with the pilot saying, 'chief officer', as if he had said it for the first time, with falling intonation. Such negotiations on roles were recognised throughout the material, and seemed to be a joint focus for both the students and the pilot. This also demonstrates that the simulated activity context is not to be conceived as 'real'—this would hardly take place on a real ship—but rather, that it is a learning environment, where instruction is provided by orienting towards participant structures and repair (Jordan and Henderson 1995).

The pilot then quickly greeted the first officer before he took his position on the starboard side of the bridge, looked out the 'window' and seemed to evaluate the traffic situation, before he stated, "so:: e:h your speed is 15 knots and increasing?" in lines 24–25.

The stating of the facts of the ship's status in line 24 was characteristic of the pilot's interaction with the students and the simulator. This sort of statement might have been a case of enacting a professional approach for joint *situation awareness*, a key concept for the students' education, through describing his comprehension of the ship's present status and implying what was to come in the near future (Endsley 1995a, b). This stating of the situation using talk, gestures, or the ship's instruments was a crucial part of securing a successful journey—this was often referred to as 'good seamanship' in the students' educational setting. On board real ships, this sort of establishment of a joint understanding of the ship's status ensures a safe sea trip. In the simulator, however, these types of statements might also constitute a common frame or context for the activities. This notion was supported by the fact that the pilot often made such declarations after their role-play encountered obstacles or distractions, as a way of supporting the simulated context, rather than for keeping joint situation awareness in a professional sense.

The dialogues in the simulator were also shaped by other factors, such as the professional background, responsibilities, and experience of the participants. Prior to the pilot entering, the interactional patterns on 'Cruise Ship Bergen' were characterised by co-construction of knowledge, discussions, and speaking aloud their considerations of what was going on around them—the students being key participants in the activity. After the pilot joined the bridge team, the interactions seemed to change towards a more peripheral participation, where the students were novices being introduced to a profession by an expert.

Encountering problems by expanding the role-play

When ships have a pilot on-board, the captain is still in charge, but obtains guidance from the pilot. In the prior extract, it seemed as though the students changed their attitudes towards authority when the pilot entered. They turned their attention to the pilot not only as an expert on the specific waters they were navigating in, but also as

a resource for determining sensible context for action. How the pilot played out an advisory role in the simulated activity context sometimes seemed to be affected by the asymmetrical relationship between students and professional in the actual educational context. The pilot's position as an authority was again apparent in Extract 2, where 'Cruise Ship Bergen' experienced total engine failure. After many attempts to get the engines running again, the pilot wanted an explanation from the instructor regarding what was going on. The students and the pilot expanded the role-play in this next extract by involving the man responsible for the engine, the chief engineer, often called 'chiefen'. The simulator did not have an engine room, and no one had seen the need for a chief engineer. Extract 2 shows how the role-play expanded, with the participants putting a considerable amount of work into keeping up a credible role-play.

Extract 2. (Original language, with some translations in italics)

1.	Pilot:	Captain would you:: e::h ask the engineers if how long it will take. in case we
2.		can ask for assistance with the towboat?
3.		((Captain picks up the radio))
4.		(2.0)
5.	Captain:	chief engineer chief engineer. over, this is the captain over
6.		((The captain calls the chief engineer on the radio, presumably expecting the
7.		instructor to take on the role of chief engineer to inform them why their
8.		controllers do not work))
9.		(9.0)
10.	First officer:	ºit (xxx) º
11.	Pilot:	ºthen make the course 3.5.4º
12.		(10.0)
13.	First officer:	°heh° (xx) is really avoiding u(h)s °haha° heh heh [°heh heh °]
14.	Captain:	[null.tre.femti]
15.		*[zero.three.fifty]*
16.	Pilot:	three.five.five.four (.) three.five.[two (xx)]
17.	Captain:	[two?] two?
18.	Pilot:	three.five.two. yes
19.	Captain:	so e:h eh shall we use this radio to e:h ((Captain holds up the radio))
20.	Pilot:	I have no idea, I don't know how you do it.
21.	First officer:	but you- (hm m)?
22.	Pilot:	I have never been in a simulator as a pilot before
23.	All:	hah hah hah hah
24.	First officer:	check (hprf) check
25.	Pilot:	yes very good (.) is that a buoy or a small boat ahead of us?
26.		((Pilot points out the window))
27.	Chief officer:	[hrmpf]
28.	First officer:	[its set] so I think it's a buoy
29.	Pilot:	[Ok, so it's..]
30.	First officer:	[it's still] °it's not moving°
31.		(9.0)

32.	Captain:	(xx) (h) E:h kan du e::h hadde du kunne sprunge ned og eh hørt me eh =
33.		*(xx) (h) E:h can you e::h could you run down and eh check with eh=*
34.	Chief officer:	=(h)spurt [chiefen]
35.		*=(h) asked [the chief]*
36.	First officer:	[ja(h)] (heh) Yes
37.		((The first officer leaves the simulator for 50 s and runs into the control
38.		room where an instructor tries to fix the technological problems the students were
39.		facing and he brushes her off by saying that the chief was drunk as usual. The
40.		pilot and the rest of the crew discuss engine and position in a general manner.
41.		Then the door opens and the first officer returns))
42.	First officer:	(h)I am afraid to report. he is drunk (h) as usual (heh)
43.		((This is what the instructor laughingly told her when she entered the control
44.		room and asked what was happening with the engines))
45.	Pilot:	drunk as usual?
46.	First officer:	we don't have any . any . machinery
47.	Pilot:	No machinery what so ever?
48.	First officer:	no . personnel
49.	Pilot:	No personnel?
50.	First officer:	no pers-(h)
51.	Pilot:	and no machinery nothing?
52.	First officer:	no (heh) the instructor told me, he was not able to eh
53.	Pilot:	OK >very good<

Prior to this extract, and without obvious reason, the crew suddenly encountered several engine problems, and later, problems connecting to the towboat that came to their rescue. In line 1, the pilot asks the captain to call up their ship's engine room to find out what is wrong. In the simulator, such an engine crew does not exist, so the captain called up the instructor and addressed him as chief engineer in line 5, presumably hoping for him to play along as the chief engineer.

Lines 10–17 show how the rest of the crew carried on with navigating whilst the captain hesitated on what to do. These lines illustrate typical talk when navigating, as one might expect; the students' actions may often be recognised as following specific procedures and routines. Such 'scripts' were often observed in student actions and in the use of specific characteristics of institutional roles—the pilot called out the course and the first officer repeated the order and executed it. In their training, this is referred to as 'closed loop communication', and is encouraged by the instructor. Being familiar with a variety of such scripts and routines is considered key to the professional execution of actions on the part of a bridge team. It seemed as though the crew attempted to simulate the actual temporal dynamics of the situation (Jordan and Henderson 1995) by keeping the role-play at all times. An alternative way of organising the training might be to use 'easy' parts of the training for discussing their actions and underlying models for action.

When he did not get any response from the instructor, the captain hesitated for a while. However, in line 19, he requested the pilot to help, without signalling that he was stepping out of the role of captain, by asking whether to "use this radio" for communicating with the non-existing chief engineer. To this request, the pilot claimed

no knowledge of how to solve the problem, and made a rare reference to their environment being simulated when he claimed that he had "never been in a simulator as a pilot before". By saying this, he was partly stepping out of his role, and it amused the students and made them laugh. This is a rare example of the pilot stepping out of role.

In line 32, the captain initiated an order to the first officer to check with the instructor, but seemed uncertain as to how to say this in an appropriate way, apparently considering stepping out of role. He had already shifted to speaking Norwegian and appeared unsure. The chief officer interrupted and, with a smile, introduced 'chiefen' (short for chief engineer) as the person for the first officer to confront with the problems. The first officer accepted the request and walked out of the simulator with a smile.

The first officer walked into the control room and asked the instructor what they were supposed to do. The instructor was busy radio communicating with other student groups, as well as trying to sort out some technical problems with the simulator. He answered, "The chief is drunk as usual", without even looking at the first officer; the first officer walked back to the simulator with a laugh. This incident was not videotaped, but observed and described in field notes by one of the authors.

When the first officer came back, she laughingly reported that "chiefen" was "drunk as usual". However, the instructor's joke was not picked up on by the pilot. The negotiation of establishing a relevant activity context was again apparent when the first officer, still speaking English, reported the instructor's humorous response. The pilot did not respond to the absurdity of the situation and stuck to the simulated activity context, keeping the role-play on 'Cruise Ship Bergen' still in force. The first officer quickly moderated and attempted to present the engine trouble in a more credible manner. This depicts not only how the role-play is negotiated, but also how the pilot exercised a leading position in defining the role-play. Just before, in line 22, he had humorously referred to their actions as 'fake', but he did not pick up on a similar approach from the first officer in line 42.

This extract shows how the students made significant efforts to act according to their expectations. It may have seemed as if there was some negotiating on whether the situation was too absurd to be a sensible context, for example, the first officer's laughing tone in line 42, but the pilot's response in lines 45–51 brought the students back to handling the situation. The dialogue illustrates how simulating a relevant context involves a considerable interactional effort for recreating a work-like environment, and does not automatically involve being able to utilise this as an environment for learning.

Responding to an emergency situation by lowering the anchor

The previous extracts, showed how the participants invested a lot of effort in jointly creating activity contexts. In the next extract, we will highlight how enacting simulated contexts provides opportunities for recreating work tasks. An example of the way in which the role-play offers relevant experiences became evident after the crew requested a towboat, and the towboat malfunctioned. The towboat acted strangely, disappearing and then suddenly popping up on the ship's port side. 'Cruise Ship Bergen' went to the second emergency plan, and dropped anchor to avoid going to shore.

Extract 3 (Original language)

1.		((The pilot is talking to the instructor on the radio, addressing him as towboat
2.		Balder))
3.	Pilot:	Balder. eh Cruiseship Bergen. eh We don't get any reaction from you from two six
4.		zero heading. So we are going very much to starboard so we have to drop our
5.		anchors if we don't e:h eh to avoid going a shore.
6.	Radio:	Bergen this is Balder(hh) (xx xx) Please release the towboat and drop the anchor
7.		immediately.
8.	Pilot:	>OK I will drop the anchor immediately< ((off the radio)) Captain. We have to
9.		drop the anchors. You can start with the port side anchor and you can. actually we
10.		can lower it out.
11.	First officer:	I- I only think we have forward (xx) anchor?
12.	Pilot:	Yeah, but we gonna use only a forward e:h, We going to use the forward port
13.		anchor (.) and you can lower it out immediately to about seven shackles
14.		(3.0)
15.	Pilot:	>very good< °and we can eh >take these off<°
16.		(3.0)
17.	Pilot:	e::h OK Oslo traffic Oslo traffic. Cruiseship Bergen. We have anchored, just
18.		outside Gullholmen. I will give you a position in a couple of minutes and eh, we
19.		will stay here until we have fixed our engines. >We have no possibility to
20.		manoeuvre and the towboat has flat out<
21.		((talking on the radio))

In lines 3–5, the pilot called up the instructor (in his role as the towboat 'Balder') requesting approval for ending further attempts to tow 'Cruise Ship Bergen' and drop anchors instead, to avoid going ashore. The instructor approved, and the pilot directed the crew to lower the anchor in lines 8–13. The simulator lacks anchor equipment that matches a cruise ship, and in line 11, the first officer shows indecision about what to do. The pilot quickly accepts this lack of simulator support and carries on with more a detailed description of how to lower the anchor.

This extract shows an example of how the simulated activity context becomes grounds for enacting specific roles and solving work tasks situated in a work-like context. The ability to anchor in an emergency situation may be crucially important for avoiding an accident. In this situation, the students are clearly unsure about how to perform the pilot's request, partly because of the lack of simulator fidelity regarding the anchoring controllers, but most importantly, because they are unfamiliar with the procedures and underlying principles for anchoring. This is made evident in the debriefing session, where the pilot's emphasis on *lowering* the anchor in lines 10 and 13 comes to be an important distinction. This incident and the pilot's distinction between lowering and dropping the anchor came up in the debriefing, and it became obvious that the students had failed to understand important aspects of the pilot's decisions.

This fact is important for considering how learning opportunities may be fostered in simulator training, for assessing simulated work tasks, and for learning through participation. Some issues regarding the students' perception of the situation and the learning opportunities that arose during debriefing are portrayed in Extract 4.

Debriefing—reflecting on action

For debriefing, the students gathered in a nearby classroom, where the instructor went through the exercise by replaying a digital map showing all the ships' actions. He chronologically responded to and discussed critical events. Close to the end of the debriefing session, he critically questioned the decision to anchor, (shown in Extract 3).

Extract 4: Debriefing (originally in Norwegian, translated)

1.	Instructor:	You had some trouble though, with the towboat incident, something…
2.	Pilot:	Yes?
3.	Instructor:	That function needs testing
4.		((The instructor is referring to the malfunctioning of the towboat))
5.	Pilot:	So it didn't go as planned?
6.	Instructor:	No no. Something happened in here
7.	Pilot:	Yes. We went starboard finally. We had to drop anchor.
8.	Instructor:	Yes. yes. heheh and how deep was it?
9.		((turns to class))
10.	Class:	(hmf)
11.	Pilot:	Well. I don't remember, probably about 60 to 70 m
12.	Unknown 1:	Close to 100 I think
13.	Instructor:	Hey captain. What happens when you drop anchor close to 100 m?
14.	Captain:	Nothing good(h) heh heh
15.	Unknown 2:	heheh it depends on the rope heheh
16.	Pilot:	[(xx) somewhere]
17.	Instructor:	[well that's..]
18.	Pilot:	OK
19.	Instructor:	If there's 100 m here. ((pointing at the electronic map)) and the pilot says to
20.		the captain ~~drop anchor~~, then the captain drops anchor. (xx) and the shackle
21.		container goes bang.
22.	Class:	hehehe=
23.	Pilot:	=Not on Bergen, cause we lower the anchor, we lower

In the first five lines of this extract, it was resolved between the instructor and the pilot that the problems 'Cruise Ship Bergen' encountered during the exercise were caused by a simulator malfunction, not by a planned crisis scenario. In line 7, the pilot remarked that they had to drop anchor due to the problems. This caused the instructor to quickly turn to the class and ask how deep it was, thereby inspiring consideration of factors for successful anchoring. When the class hesitated, the pilot responded "60 to 70 m" in line 11, followed by one of the students, who estimated "close to 100". The instructor kept the focus on the class, rather than on the pilot, and in line 13 called for the captain to respond regarding what happens if the anchor is dropped at 100 m. Both the captain and the rest of the class seemed to see what was coming, and laughingly accepted that anchoring was a bad idea before the instructor explained how the anchor's shackle container would be broken by the force of dropping an anchor that does not reach the seabed. The laughing class was interrupted by the pilot, who eagerly claimed that they did not *drop* anchor, they *lowered* it. Lowering the anchor is a strategy that avoids the danger of damage to the shackle container (which the instructor

pointed out), while at the same time securing the ship with a drifting anchor that might hook onto the seabed and keep the boat from going ashore. The extract ends with the pilot emphasising that the instructor's critique was not relevant to the pilot's actions. This distinction led to a further discussion regarding the crew's relationship with the pilot versus the captain, and factors to evaluate when dropping anchor.

Extract 3 showed that the students dropped anchor without question when the pilot made this request, but the debriefing in Extract 4 shows that the students did not understand the nuances of the pilot's request. There might be several reasons why the students missed this. Perhaps they would have picked up on the complexity of anchoring if they had received more thorough theoretical instructions earlier in their studies, or if the pilot had expressed his reasons for 'lowering' more explicit. Alternatively, perhaps the students would have noticed the pilot's strategy if the anchoring device in the simulator was more detailed, as on a real cruise ship. Nonetheless, the students would obviously profit from paying closer attention to the underlying reasons for action. This was symptomatic of the crew's attitude after the pilot came on-board: the crew held back and let the pilot take control without asking questions. According to maritime law, the pilot is only an advisor, unless the ship is without competent leadership, influenced by alcohol, or other such circumstance, so the captain should be confident that the appropriate decisions are made. In Extract 4, it appeared that the captain had conflicting ideas about what would happen when dropping anchor mid-sea, but he did not express these views in the simulated interactions. In this case, the complexity of the pilot's request was not made evident—or learnable—before it was questioned in the debriefing.

Discussion

The analysis of this article portrays the social practice of simulating a bridge crew solving work tasks for navigating in close waters. This is an interactional level that has seldom been made the object of assessment in prior studies of ship simulators. The extracts display how proper student responses are tied to enacting jointly constructed activity contexts, and that opportunities for learning and instruction are entwined with these meaning-making activities. Some interesting qualities, problems, and opportunities in simulator training become salient through the particular situations that were analysed. These findings may add to strategies for training, by showing how structuring interactional entities of simulator training is significant for learning opportunities.

In the analysis, Linell and Persson Thunqvist's concept of activity contexts was used as an analytical tool for making evident two competing interpretations of what was going on in the simulator. The participants seemed to negotiate what activity contexts they were acting on, and two contrasting activity contexts are opposed in the analysis: 1. The participants were professional seamen on a ship bridge navigating through close waters with a local pilot on-board for guidance, achieved through role-playing; and 2. The participants were students attending a training situation at a maritime educational institution, where a professional pilot was participating to show them how navigating and cooperating with a pilot might occur on a real ship.

Extract 1 shows an example of how the simulated activity context is created between the participants, and the negotiating of whether chief officer was the proper title showed that such activity contexts provide possibilities for instruction without stepping out of role. However, it is apparent throughout Extracts 1 and 2 that maintaining a credible role-play is a meaning-making activity that takes a lot of effort. To a certain degree, it shows that the

simulated activity context becomes grounds for enacting specific roles and solving work tasks situated in a work-like context. Typically, the participants used English as the proper language when simulating being on a ship, and this use of language may be recognised as a way of negotiating the relevant context. An example of this is found in Extract 2, where the students invented a fictional chief of machinery. The captain shifted to speaking Norwegian but remained in role, as was picked up on by the chief officer, who found a credible answer to their need for consulting the instructor. This seemed to be a way of negotiating whether the trouble they were facing was best handled as a problem with the simulator to be discussed in the context of a training situation (activity context 2) or as a professional issue that was best handled in role (activity context 1). Their efforts could have been motivated by wanting to solve the problems at hand, wanting to create authentic experiences, or perhaps, wanting to show the pilot that they were fit to handle crises and problems that demanded creative solutions. This negotiation might display an on-going consideration of whether the main objective was to use the simulator as a means for instruction, or showing ability for recreating authentic work situations.

The analysis of Extract 3 shows how the enactment of professional roles enables some opportunities for situated actions that are close to those on a real ship. It is shown that establishing a simulated context for playing out professional roles offers opportunities for experiencing and enacting work-like situations, as well as some challenges for picking up on issues regarding generality and the underlying principles of decision-making. In Extract 3 the pilot takes control of the situation, and the students take on a more peripheral position. A simulator training design that arranges for such peripheral participation as observed in Extract 3 seems worthwhile in the sense of sharing the expert's skills, experience, and situated considerations. However, a peripheral role may also cause problems: in Extract 3, the captain did not question or discuss the pilot's request to lower anchor, and in Extract 4, this was revealed as an action for which the captain had not fully considered the consequences before debriefing. This incident highlighted the importance of sharing *why* actions are taken, and may be recognised as processes of cultivating experiences into knowing by conceptual apprenticeship (Collins 2006; Bruner 1996).

The discussion in Extract 4 was made possible by the crew's consistent role-play, which made a distinction between the professional concepts of *dropping* and *lowering* the anchor, introduced in Extract 3. The participants' role-playing made possible this joint expanding of what is involved in dropping versus lowering the anchor, and thereby provided an opportunity to learn about the complexities of anchor handling in debrief. Extract 4 illustrates both the potential for simulating bridge communication and for debriefing sessions that also pick up on the students' activities on a dialogical level. This confirms how debriefing makes room for reflection and corrections; it also shows that it may be useful to have structures for sharing and discussing. In the case of lowering or dropping anchor, the instructor asked what seems to be a rhetorical question, displaying to the group that dropping the anchor was wrong. Only when the pilot picked up on this, productive discussions and nuances were brought up. However, this also involves practical issues. In the simulator session observed in this study, the instructor only relied on the simulated ship's movements on an electronic map in the instructor's room, the participants' reports, and short visits to the simulators. Connecting to the interactional level of simulator training may profit from more thorough observations of the participants' talk activities, and new strategies, such as video debriefs might be useful for creating such connections.

The vignettes in this article shows not only how role-playing has the potential to shape learning environments, but also that such simulated activities must be treated significantly differently from actual work practice. Issues of professional practice that hardly may be

recreated in a simulator are evident in Goodwin's (1995) analysis of the dynamics of scientific enquiry on an oceanographic research vessel. Goodwin's analysis shows how time, space, and the temporality of actual work practices shape the nature and conditions for action. Such intricate relations and processes may hardly be simulated in a school setting. Further, when organising simulator training is important to consider Stokoe's (2011) emphasis on the problems of simulating authenticity in role-play, and that it is a fallacy to expect participants to simulate the emotions, intricate relations of power, and goal-orienting that reflect the actual practices. In this article, the students' reluctance to question the pilot's decisions in extract 3 made apparent that even if hierarchical professional roles are enacted in the simulator, actual positions and authority also influence collaboration. This concerns the dynamics in social practices of simulating in a ship simulator, and supports many of the claims made by Rystedt and Sjöblom (2012) regarding how realism and authenticity are interactionally constituted in training. However, it also shows how the practices of simulating are closely entwined with the maritime profession's specific way of organising and perceiving the world, which requires further studies specific to this domain.

Considering the ways those interactional aspects of simulating affect opportunities for learning and instruction, we believe this could be offered more attention in future training. In this analysis, it is seen that having a professional participating in the simulator affected and shaped the students' actions. There are many other ways of adding realism or providing expert feedback than those portrayed in this particular training; for example, by giving students specific role assignments or having other professional groups attending. Future designs for simulator training could consider new ways of configuring the ways that participants enact professional positions for achieving specific learning objectives, and develop strategies for providing feedback on these situated actions.

Concluding remarks

This article outlines empirical demonstrations of students establishing a relevant context for their activities by role-playing. The participants' collaboration to create credible interactions was conceived as a matter of creating joint activity contexts, by employing both physical and cognitive contextual resources. It is evident not only that the simulated context provided opportunities for learning matters deeply situated in the professional doings of the profession, such as the emergency anchoring, but also that the simulation must not be confused with 'reality' as such. The students' actions frequently demonstrated that they were acting in an educational setting, where very different things were at stake than on a real ship.

Linell and Persson Thunqvist's (2003) conception of activity contexts has been employed to distinguish a simulated context from the training context. This specific case of training has been especially suited to such an analysis because of the consistent use of English as the professional language. However, the investigation of notions of context and learning are more widely relevant than just for ship simulator training. From our perspective, rich understandings of how context is constructed and made use of in social interaction is key to examining learning as situated activity. This article reveals that social construction of context is closely related to learning opportunities, and adds to the complexity of Suthers' description of intersubjective meaning making as the "joint composition of interpretations of a dynamically evolving context" (2006, p. 321), by portraying how the students' way of jointly creating a simulated context may be considered a meaning-making activity in itself.

The four extracts presented in this article shed light on how simulating activity contexts in a ship simulator is achieved interactionally. The portrayed activities are also exposed as

controllable units when facilitating simulator activity. The analysis has shown that structuring interactions in the form of enacting professional roles and responding to a simulated activity context affects opportunities for the students to learn. Further, it has shown that managing a credible role-play takes a lot of effort and may come into conflict with other objectives for training, such as instruction or asking for help. This analysis has made salient some of the complexities of simulating, which may be useful for further research and developmental work on creating scenarios, considering fidelity, or facilitating simulator training in general. The ship simulator studied in this article has clear potential for learning, but this study has shown that the *simulated* far exceeds the simulator. The learning environment, with a multifaceted set of possibilities that may be utilised in a variety of designs for learning, involves recognising the students' talk activities as crucial for learning how to handle a real ship.

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Appendix 1. Transcription conventions

[]	Square brackets mark the start and end of overlapping speech. They are aligned to mark the precise position of overlap.
Underlining	Underlining indicates emphasis; the extent of underlining within individual words locates emphasis and also indicates how heavy it is.
CAPITALS	Capitals mark speech that is audibly louder than surrounding speech. This is beyond the increase in volume that comes as a by-product of emphasis.
°I know it	'Degree' signs enclose audibly quieter speech.
(0.4)	Numbers in round brackets measure pauses in seconds (in this case, 4 tenths of a second). If they are not part of a particular speaker's talk, they should be on a new line. If in doubt, use a new line.
(.)	A micro pause, audible but too short to measure.
((stoccato))	Additional comments from the transcriber, e.g. about features of context or delivery. Refer to the previous line.
she wa::nted	Colons show degrees of elongation of the prior sound; the more colons, the more elongation.
Yeh,	'Continuation' marker—speaker has not finished; marked by fall-rise or weak rising intonation, as when delivering a list.
>he said<	'Greater than' and 'lesser than' signs enclose speeded-up talk. Occasionally, they are used the other way around for slower talk.
solid.= =We had	'Equals' signs mark the immediate 'latching' of successive talk, whether of one or more speakers, with no interval.
heh heh	Voiced laughter. Can have other symbols added, such as underlining, pitch movement, extra aspiration, etc.
sto(h)p i(h)t	Laughter within speech is signalled by h's in round brackets.
y'know?	Question marks signal stronger, 'questioning' intonation, irrespective of grammar.
Yeh.	Full stops mark falling, stopping intonation ('final contour'), irrespective of grammar, and not necessarily followed by a pause.

(xx) or (blrf) Un-gotten material. Nonsense syllables are sometimes provided, to give at least an indication of various features of the un-gotten materials.

The transcriptions follow standards from Jefferson (2004), and are inserted from:

http://www-staff.lboro.ac.uk/~ssjap/transcription/transcription.htm

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