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Contextual dynamics in clinical workplaces. Learning from doctor-to-doctor consultations

Context: Some studies have explored the role of learning context in clerkships and in clinical teams. Very little is known, however, about the relation between context and competence development in more loosely framed, day-to-day practices such as doctor-to-doctor consultations; constellations which are frequent and typical in clinical work.

Methods: To address this gap in the literature, a study was carried out including semi-structured interviews in four different hospitals, and participant observation at one site. Inductive content analysis was used to develop a framework. Special reference was made to the principles of situated cognition (SitCog).

Results: The framework illustrates how different situational, personal and organisational factors interact in every learning situation. The interplay manifests itself in three different roles that doctors assume in highly dynamic ways: doctors learn as "actors" (being responsible), as "participants" (being involved) and as "students" (being taught); these contextual influences also impact on the quality of learning within these roles.

Conclusion: The findings add to the current literature on clinical workplace learning and to the conceptualisation of context in the field of education. The practical contribution of the research lies in disentangling the complex dynamics of learning in clinical environments and in helping doctors and medical educators to increase their responsiveness to contextual factors.

INTRODUCTION

We begin by discussing the existing concepts and empirical findings of context, and learning in context. We make particular reference to the theory of situated cognition (SitCog), which, as we argue, serves as a good starting point for understanding learning in the dynamic context of clinical workplaces. Then, we briefly introduce doctor-to-doctor consultations, an under-researched example of learning in loosely framed, day-to-day practices, which are the unit of analysis for this study.

Notions of context and situated cognition

While many fields, such as geography, architecture, anthropology, psychology and computer science, are concerned with notions of "context", "space", "place", "environment" or "climate", in educational studies the meaning of these concepts tends to be neglected and under-theorised (1, 2). Basically, two different notions of context or climate can be found in the social science literature (3) that are also reflected in the field of medical education. Some scholars consider context to be an element that *surrounds* learners in terms of a shell or a container. Others argue that context is actively produced and arises from activity and interactions (3-5).

Situated learning theories, and Situated Cognition (SitCog) are valuable approaches that help to study context (6). They support the second perspective, because they shift the focus from individuals *in* an environment to the interactions (or processes) between individuals *and* their environment (7-9). Accordingly, knowledge is not considered an element that is exclusively in the minds of people but rather *"situated, being in part a product of the activity, context, and culture in which it is developed and used*" (10). The meaning of situated learning and SitCog was also recently stressed in the field of medical education because, as it has been argued, it would help to better explain the complexities of learning in clinical and medical contexts (11-13).

Learning in (clinical) contexts

In medical education, it is widely acknowledged that the development of medical and clinical competences is context dependent (14). The term context, however, is inconsistently discussed (11, 13, 15-17). For example, studies characterise context by physical, semantic, affective, temporal or social dimensions (13, 16). It has been suggested that a more detailed understanding of how contextual factors influence clinical workplace learning would be valuable (18, 19). Boor et al. underline that in particular, the interplay of factors that affect the quality of a clinical learning climate tends to be neglected (20).

Most studies have been conducted to investigate the learning context of students in clerkships; for their learning, the importance of an integrative, supportive and participative team culture in clinics has been emphasised. Thus, inter alia, the learners' roles, their individuality and their work contributions have to be acknowledged by other team members, and there is a need for an "environment" that allows them to progress from peripheral to more central participation and, thereby, to develop professional identities (15, 20-22). One study identified five influencing factors that affect the learning of undergraduate medical students in internships: the agenda of the internship, the attitude of the supervisor, the culture of the training setting, the intern's learning attitude and the nature of the learning process (23).

In postgraduate medical education, studies have offered similar concepts about participation in clinical activities and adequate support (18, 24). Moreover, factors such as time pressure and workload have been reported to be relevant (25, 26). Similarly, a study describes the different

implications of patient census (patient illness, total number and pace), time sensitivity and conflicting commitments for learning and teaching in ward teams. The authors noted that the sources (colleagues, books, etc.) that were consulted by learners shifted with an increasing census towards "quick, authoritative, readily available sources"(19) .

Learning in the "context" of doctor-to-doctor consultations

Very little is known, however, about the relation of context and learning in more loosely framed, day-to-day practices such as doctor-to-doctor consultations; constellations outside typical team structures that have no formal learning elements. In consultations, doctors refer to more experienced and specialised colleagues, typically for a more complex patient case outside their competence. For instance, a doctor may involve an on-call physician from another specialism (expert); or, in more complex cases, if the on-call doctor is a resident (and, in turn, acts as a *learner*), s/he may subsequently also refer to her/his attending physician. While learning and education in clinical workplaces comprises different types of informal learning, such as working with clients (patients), being mentored and working alongside peers (27), consultations are mostly dyadic practices that involve medical actors with different areas and levels of knowledge. One-to-one interactions are, however, very typical for interprofessional clinical work. Surprisingly, they have been widely ignored in the interprofessional literature to date (28).

METHODS

Research question, data collection and analysis

Against the background of the gaps identified in the literature, this study attempted to address the following research question:

- How and to what extent is clinical workplace learning influenced by contextual factors in loosely framed, day-to-day practices such as doctor-to-doctor consultations?

In our study we focused on doctor-to-doctor consultations, since they are very typical for clinical work and are rich sources of inter- and intradisciplinary learning, particularly for the residents involved (29-32). Consultations between the emergency department (ED) and other specialist departments were chosen because of their frequency, variety and intra- and interdisciplinary nature, which allowed us to include many disciplines in the investigation involved (29-31).

Process

The research was performed in several phases (see table 1); first, a brief field study of 10 hours, including observation and informal talks was carried out. Then, in phases 2 and 3 a number of 17 doctors were interviewed in four different hospitals in Switzerland.

By following purposeful and typical sampling strategies (33) we involved a wide range of cases including participants with roles typically represented in consultations in smaller as well as in larger hospital (33). (For the sample characteristic of the interviewees please see appendix). Eventually, participant observation was conducted at one site (see table 1). Data collection was ended upon reaching theoretical saturation (34).

Interviews

For the individual, semi-structured interviews, an initial question guide was prepared and iteratively developed (35). The interviews, which lasted for 30-100 minutes, were centred on participants' personal experiences and perspectives of doctor-to-doctor consultations, including processes, roles, and responsibilities, as well as other contextual influences that helped or hindered learning in the context of consultations. The interviewer explicitly intended to follow themes that emerged during the interviews (33).

Observation

During the field study, direct participant observation (33, 35) was combined with the shadowing of individual doctors (36) and brief informal interviews. Observation was particularly helpful for understanding the learning processes and the associated learning roles (see Figure 1). Field notes were taken during the observations, and the data were entered into the qualitative software Nvivo within 4 hours of leaving the clinic.

Phase 1	Brief observation (hours = 16 h)	Hospital A	May - June 2010
Phase 2	Semi-structured interviews (n= 10)	Hospital A and B	January - March 2011
Phase 3	Semi-structured interviews (n=7)	Hospital C and D	June - July 2011
Phase 4	Participant observation (hours = 60 h)	Hospital A	February - April 2012

Table 1: Phase and methods of data collection (A: University Hospital, B: Cantonal Hospital, C: Regional Hospital, D: University Hospital)

Analysis and validation

Interviews were audiotaped, transcribed verbatim and then entered into the software package Nvivo along with the field notes. An analysis was performed using the method of inductive category formation, a procedure of qualitative content analysis suggested by Mayring (37). According to the research questions and to the principles of SitCog, the level of abstraction and selection criteria for categories were roughly defined as influencing factors and their interplay. Learning in consultations was analysed in particular from the perspectives of the residents involved. One researcher (CP) analysed all the data and iteratively developed categories. In parallel, a second researcher (NP) read, re-read and interpreted approximately 20% of the material. Together with the third researcher (UG, a medical doctor and insider at the clinics A and B), the coding structure and the conceptual framework that emerged from the data were iteratively developed and critically discussed until consensus was reached. Finally, the material was re-worked by CP according to the accepted coding scheme. In order to evaluate inter-coder reliability, a fourth person, not an author, coded 20% of the material. Inter-coder reliability between the two coders was assessed using NVivo8 functions. Upon discussing ambiguities (38), all nodes and sources achieved an agreement > 90%. According to principles of respondent validation, participants were invited to comment on the preliminary results. A few participants made minor suggestions that did not require changes in the framework (39).

Ethical considerations

Ethical advice was sought from the regional ethical review board. The committee decided that on the basis of the research concept, no further ethical approval was required. In addition, ethical advice was also given by a specialist outside the research team, a professor of ethics at a Swiss university who was part of a separate Swiss Ethical Board. The confidentiality of the participants was ensured.

General agreements were made with the departments in the different hospitals, and prior to the interviews, written (informed) consent was obtained from every participant. All of the participants allowed the conversations to be tape recorded. For field observation, an ethical code of conduct was developed with the ethical expert.

RESULTS

Before we discuss contextual influences including personal, organisational and situational factors and their implications on learning in detail, we characterise three roles that result from the interplay of these influences. (To illustrate the findings, empirical examples from the interviews and the participant observations are cross-referenced between the text and appendix 1).

Learner's roles

- **Doctor as actor (being responsible)**

  This role can be characterised by high degrees of exploratory and self-directed learning. This means that learners independently examined, evaluated and treated patients, accessed codified knowledge (18, 40) and, thereby, developed their own diagnostic and therapeutic conceptions. Responsibility and pressure, which were linked to this role, were deemed to be particularly relevant to learning (01.08) given the opportunity to involve experts in case of insecurities and questions (02.07).

- **Doctor as participant (being involved)**

  When doctors learned as "*participants*", they were involved in situations with more experienced and specialised doctors (hereafter "experts"[1]). They had the opportunity to rather passively observe and listen (03.13); they could also actively take part by articulating their conceptions (elaborated as "actors") and by asking focused questions (04.13).

- **Doctor as student (being taught)**

  In the role of "*students*", doctors benefited from the deliberate teaching of experts, processes that went beyond the requirements of normal patient treatment. In these situations, doctors were challenged by critical questions (05.02) and were supported in the form of demonstrations and explanations (06.06) in order to facilitate learning.

Learner characteristics

Motivation and domain-specific interest

In general, the motivation and interest of doctors to learn in daily work situations and in consultations was deemed high (07.13). However, the residents were differently interested in consultations. These differences were linked to the different motivational dispositions of learners (8.04). The motivation to learn was also dependent on the degree of a case's alignment with the learner's special interests and intended specialisations (09.15). High interest and motivation were naturally tied to very positive effects on learning in all three roles; in the role of *actors*, motivated

[1] This does not mean that experts cannot benefit and learn from consultations.

doctors were reported to engage more pro-actively in learning situations (10.PO) and explore cases more thoroughly and were more likely to access codified knowledge (11.08).

Motivation greatly influenced the *participatory* role; if doctors were interested in a case, they actively attempted to participate in situations with experts (08.04, 09.15) and they involved themselves, for example, by asking questions. If the learners showed interest and motivation, they were able to stimulate the experts' teaching processes, including soliciting deliberate explanations and demonstrations from experts (12.13). In this way, learners' could influence the extent to which they benefited in the role of *students*.

Experience, expertise

General as well as domain- and case-specific experience and expertise were deemed crucial to determining to what extent and how doctors learned in consultations. The younger doctors were and the less experience they had, the more relevant consultations were deemed to be for their learning (13.12). This association was particularly apparent for cases that doctors were confronted with for the first time (14.01). The learners' specific experience and expertise also shaped their roles; the more experienced that they were and the more confident that they felt in evaluating a case, the more self-directed their working and learning (as *actors*) was. As they involved experts less often and later, the level of the experts' support was lower (15.PO).

Less experienced doctors frequently involved experts and learned more often as "*participants*" (16.PO). Similarly, a lack of expertise and experience of learners also solicited deliberate teaching processes, for example, by repeating important information and by asking challenging questions (17.14) and, thereby, placed learners in the role of *students*.

Expert characteristics

Personality/communication attitude

The learners' roles were largely influenced by experts' personal characteristics, abilities and behaviour. In consultations, experts were said to greatly differ with respect to these characteristics. While the learners' interactions with open and communicative experts were reported to be highly valuable for learning, interactions with dominant and reserved characters who did not explain the underlying motives of their actions, were deemed unhelpful (18.06, 19.07).

In this sense, how and the extent to which learners acted as "*participants*" in consultations varied greatly from expert to expert; some tended to pro-actively invite learners to join them in patient examination and involved them actively in discussion and decision making (20.14). While some attending physicians were likely to involve themselves in consultations, others delegated this responsibility mostly to residents who then learned as "*actors*". Some experts were even reported to discourage their own involvement through their dominant and intimidating character (21.08). These are aspects that do not only deteriorate the quality of learning but can also negatively impact on patient treatment.

Teaching abilities

Naturally, the extent to which doctors benefited as "*students*" from teaching was very much dependent on the experts' teaching abilities, which also differed considerably from person to person;

some experts were reported to have excellent teaching skills because they asked challenging questions about the learners' conceptions of diagnostic and therapeutic measures and facilitated learning by providing explanations beyond the necessities of treating the patient (22.17).

Organisational/cultural influences

Hospital: size, scope

Although there were many commonalities across larger and smaller hospitals with respect to doctor-to-doctor consultations (23.08), doctors noted that in smaller hospitals they tended to treat patients more independently and to make decisions and solve problems more autonomously (24.08). Working and learning more often and more intensively in the role of *actors* was considered particularly valuable for learning (25.14,26.11). In larger hospitals, doctors learned more extensively in the role of participants/students and benefited from the highly specialised knowledge of a large number of experts from different specialties (27.05).

Department: culture, roles

It became also evident how communication and learning were shaped by different cultures within and between departments. For example, experts from some departments were likely to limit personal interaction with the requesting doctors from the ED to a minimum. They examined patients on their own and solely left written notes. In doing so, they restricted opportunities for learners from the ED to assume a *participative* role (28.02). Other departments that were characterised by a communicative open culture and flat hierarchies were linked to intensive participation and the deliberate teaching of less experienced doctors (29.13).

Moreover, the organisation of the roles of on-call doctors varied widely from department to department. While in some departments attending physicians mainly assumed this role, residents assumed this role in other departments (30.07). While in some departments experienced residents acted as on-call doctors, in other departments residents were required to assume this role from the very beginning of their specialist training and, accordingly, needed to work relatively independently in the role of *actors* in the early stages of their career.

Situational influences

Patient census: complexity, urgency and patient number

Because doctors learned in clinical workplaces through working on patient cases (31.09), case characteristics were central elements of the development of clinical competence. In the context of consultations, doctors linked the case complexity to their individual learning experiences. They particularly indicated that they learned from more complex and difficult cases (32.04). Moreover, the learners' roles were closely tied to case complexity: if cases were less complex, doctors tended to work and learn autonomously (33.08) in the role of *actors.* Increasing urgency and complexity required more and closer involvement of experts. In this context, less complex cases were also solved through phone calls with experts; in contrast, more difficult and less straightforward cases necessitated on-site interaction between learners and experts and allowed for learner *participation* (34.13).

High patient census and the associated workload negatively affected the quality of the residents' learning in general (35.02). In the role of *actors,* it limited thoroughness of self-directed examination and time for reasoning processes and the extent to which learners accessed codified knowledge (36.17). High patient census also very much restricted the extent and quality of the *participatory* role by pressuring residents to continue with the treatment of other cases instead of joining the examination by experts (37.09). It also prevented learners from attentive listening to experts (38.04) and from asking questions for clarification (39.17). For experts, high census hampered the attending physicians' involvement and, therefore, limited participatory situations for learners (40.14). Similarly, the extent and quality of teaching, which gives residents the opportunity to learn as "*students",* was affected by high census, because it limited oral explanations (41.10), physical demonstrations and the challenging questions asked by experts (42.05).

Time: day, night, weekend

Time as situational influence considerably shaped learning in consultations and, in particular, the learners' roles. During dayshifts, learners easily involved experts and learned as "*participants*". During late and nightshifts and on weekends, learners had to act and decide more independently as "*actors*" (43.13), opportunities they deemed very relevant for their learning. In these shifts, learners often involved experts only through telephone calls (44.12), or if an on-site support was necessary, learners needed to manage the patient for at least some time on their own. During nightshifts, the experts' motivation for teaching was reported to be lower, and, accordingly, learners benefited to a lesser extent in the role of *students* (45.11).

Learning effects: knowledge, skills, self-confidence and security

Learning was framed by the triangular relationship of the roles assumed by the residents and doctors. In the role of actors learners developed own conceptions. In the roles of participants and students, they were enabled to contrast their conceptions to those of more experienced medical actors (46.06). This comparison triggered important opportunities for reflective practice in the sense of reflection-on-action (41). The effects of learning were described with respect to two dimensions. First, learners gained knowledge and skills for future situations (46.06). In addition to biomedical and clinical knowledge, there were procedural and cultural forms of knowledge and skills involved, i.e., *learning how we do things here* (18, 40, 42); residents learned, for example, what diagnostic processes needed to be conducted before a specialist could be involved; which specialists were responsible for what kind of injury (there were similar/overlapping competence areas that needed to distinguished by new doctors - for example between oto-rhino-laryngologie and cranio-maxillofacial surgery; how a patient needed to be presented to a specialist in order to demonstrate the competences of the ED team (47.PO); these are forms of cultural and procedural knowledge and skills that could vary depending on the organisational unit. With respect to communication and co-operation skills, consultations provided also valuable opportunities for residents and less experienced doctors to learn the precise articulation of patient cases; they were deliberately encouraged to practice articulation skills by more experienced doctors (48.11); Moreover, consultations offered opportunities for residents to learn and engage in important conversations with patients and family members (10.PO). Knowledge and skills were not simply re-used in new cases but needed to be evaluated and adapted according to the contextual specifics of the new situation in a process of deliberate reflection (49.09).

Second, the interactions also affected the learners' self-confidence and security. Situations where they had the same or similar approaches and concepts compared to experts increased their confidence and security for future situations (50.02). However, learners also deemed cases relevant where their conceptions did not equal the expert ones and would have led to potential mistakes if they had not been corrected. When the learners' security and self-confidence were irritated, they indicated that these occurrences increased reflective practice, sharpened their awareness and increased their concentration for future situations (51.08).

DISCUSSION

Main findings

While doctor-to-doctor consultations can offer rich and manifold opportunities for the residents' learning, existence, form (role) and quality are very much the result of the interplay of different contextual influences. These influences include individual factors, such as the motivation, special interest, expertise and experience of the learner and the personality, communication attitude and teaching abilities of the expert; organisational and cultural factors, such as hospital size and scope and the culture of departments and the organisation of roles; and situational influences, such as the number, urgency and complexity of cases and time, which can vary from situation to situation. The factors interact differently in every learning situation. Their interplay manifests itself in the following three roles that doctors assume in highly dynamic ways: *actors* (being responsible), by working autonomously; *participants* (being involved), by taking part and learning from situations with more experienced and specialised colleagues; and *students* (being taught), by receiving concrete instructional support in the form of explanations, demonstrations and challenging questions. According to contextual influences learners change their roles within consultations. Over time, the learning effects accumulate to general and domain specific experience, expertise and interests. Also, doctors learn more and more in the role of actors throughout their careers. For learning and competence development, all the roles are important. What makes a difference is the quality of learning within one role, which also results from the interplay of the contextual influences.

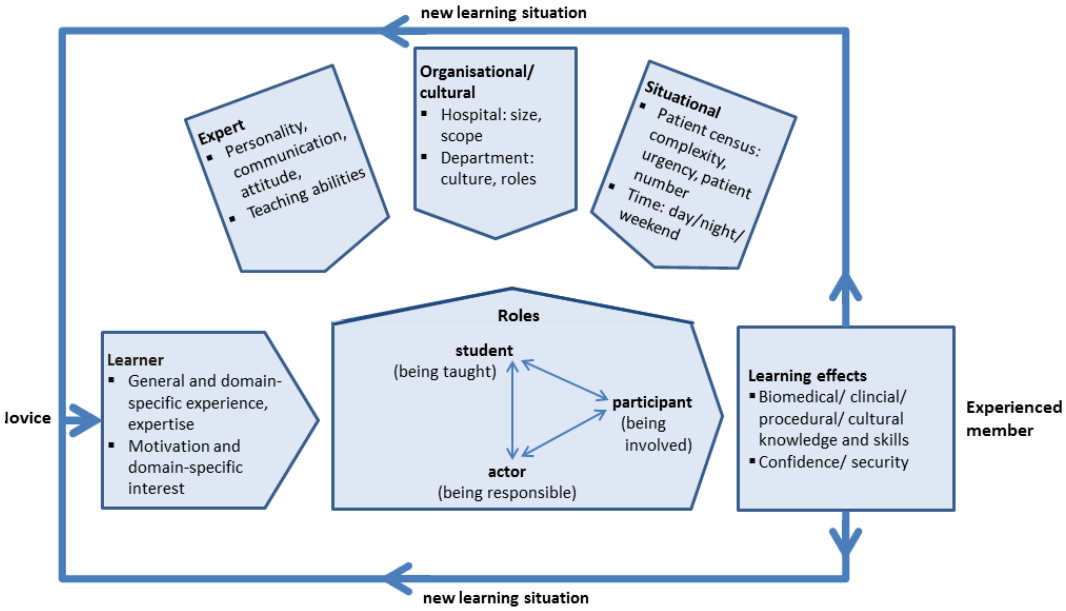

Figure 1 Learning context as the interplay of influencing factors using the example of doctor-to-doctor consultations

Theoretical and practical discussion

While the framework is new, some findings are in line with previous studies from other areas of clinical/medical workplace learning. It has been reported, for example, that the learning context and culture differed between departments (20) and hospitals (15). With respect to patient census, learning has been very closely linked to individual cases (15), and differences in patient census have resulted in more or less intensive learning experiences (19). Teaching has been found—similarly to our study—to be limited by time constraints (26). Though teaching was considered very important, self-directed work, decision making and taking responsibility was reported to provide valuable opportunities for learning (22). Some studies have also identified the different attitudes of clinical experts towards teaching as relevant (23, 43).

The framework developed in this study relates in particular to the models created by Dornan and colleagues (21) and Boor et al. (20) on the learning of undergraduate students. Both papers stress the importance of individual (motivation, identity, skills), organisational (department, team organisation) and curriculum factors (schedules, learning objectives) and their impact on participation and learning. In our study, which was focused on the learning of residents and doctors in loosely framed, day-to-day practices, no curricular structures were found. Instead, the interplay of organisational, individual and situational factors formed the "workplace curriculum" and determined the form and quality of learning. Moreover, our concept of participation was not so much about legitimacy because every doctor involved had relatively clear roles and responsibilities. Effective learning in the settings observed involved a blend of roles, including participation and, literally, "non-participation", in the sense of self-mastery, i.e., performing autonomously and independently in the role of an *actor*.

According to the framework and in line with principles of situated cognition, the locus of learning is not the acquisition and retrieval of knowledge. Instead, learning occurs in the dynamic interaction of the learners' capacities and attitudes with other contextual factors across work situations. These factors do not determine learning in a linear and predictable way; they should rather be considered

"preconditions" (44), which increase the likelihood that a certain interaction will occur and that a role will be assumed. While the framework places centrality on the development of the learner, it needs to be acknowledged that the interactions also influence other contextual factors. For example, they shape (and can alter) departmental culture and they also impact on the experts' competence development (45-47). These findings also illustrate the limitations of considering context as an element that surrounds the learner. Instead, we prefer an active notion of context (7, 8, 13). We suggest viewing context as the interaction of contextual factors that evolves and changes over time and results in different forms (roles) and quality of learning.

From a practical standpoint, the framework can help clinicians to better understand the complex and situational dynamics of learning in loosely framed, day-to-day practices such as doctor-to-doctor consultations. The framework might be used, for example, as a tool in team meetings or in mentoring to reflect current roles in learning and teaching practices. In this sense, the model can permit residents and doctors to increase their awareness of and responsiveness to the interaction of various contextual factors, and may allow them to better harness learning opportunities situated in their daily work. Since in consultations younger residents benefited in the role of *actors* by working relatively autonomously, they should be enabled to take this role also in early stages of their specialist training. However, the tasks must be in the range of the learners' competences (22) and attending doctors need to be at hand for quality control as well as in case of questions and insecurities. In the framework, also the influence of the experts has been clearly demonstrated. Communication attitudes and abilities appear to be (still) very unevenly distributed among attending doctors and can very negatively impact on the learners' competence development, and also on the quality of patient treatment. In this light, the role of doctors as communicators (48) and in particular of teachers in informal work settings appears to be (still) neglected. An observation that reinforces also the claims of Epstein & Hundert for more comprehensive, summative and formative assessments of professional competences including communication skills and, as we would argue, related teaching skills (14).

Strengths, weaknesses and future research

One strength of this study lies in the triangulation of data, methods and investigators, as illustrated in the combination of observational and perceptual data created through interviews and observations and in the involvement of doctors from many different (sub-)specialities (see appendix), as well as in the co-operation of investigators from different fields of educational research (medical education, workplace/professional learning, linguistics, teacher education and development). The findings of this research were also strengthened by independent coding (and calculating inter-coder-reliability, see, for example (49) by member checking and contrasting the results with existing theories (35, 39, 49).

While theoretical saturation was achieved within the settings specified (34), the results are weakened by the fact that the research was restricted to one specific country and that the observation was conducted in one site only. Also, the use of purposeful and typical sampling strategies with a wide range of cases (33) involving varying roles and different hospitals might have led to bias in the data - considering the rather small number of study participants. Since consultations are based on more complex cases, the focus of the research was on medical/clinical

and procedural expertise. The loosely framed and mostly dyadic constellations can be well explained by situated learning approaches and are typical for interdisciplinary clinical work (28). However, little attention was paid to learning related to networking, team processes, relationship building or identity formation in the sense of social learning theories. Accordingly, any generalization of the results beyond the context of doctor-to-doctor consultations must be treated with caution. Moreover, the model is by no means comprehensive because it only includes the inner layers of the "Russian doll like composition" (50) of workplace factors; it does not pay attention to the broader economic, regulatory, and social contexts of hospitals and the overall health system.

In view of these limitations we suggest that future research (a) more explicitly considers non-medical/clinical aspects of knowledge/skills and, in so doing, explicitly addresses aspects of identity formation, relationship building, peer-to-peer learning, cooperation and psycho-social needs in the sense of social learning theories; (b) explores other situations/units of analysis than consultations, (c) in other cultural/geographical settings and (d) involves quantitative research methods to research the phenomenon more broadly.

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