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Neurorehabilitation analysed through 'situated learning' theory

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This paper proposes a perspective of learning in the context of neurorehabilitation. Central concepts from Lave and Wenger's theory of situated learning are presented as a promising theoretical perspective to grasp the problems typically encountered by professionals and a strategy to analyse the effectiveness of rehabilitation strategies aimed at everyday activities. Empirical data from field studies and focus group interviews describing rehabilitating efforts were analysed and discussed using central concepts from the 'theory of situated learning'. We found that professionals are challenged when including patients with severe brain injury as 'participants' in the 'rehabilitation practice community'. Systematic use of the proposed learning concepts may support rehabilitation professionals to facilitate and challenge patient participation and learning during rehabilitation. Two interrelated levels of pedagogical challenges exist: (1) supporting the gain of the patient or compensation for changed learning abilities and (2) supporting the patient in learning or compensating for lost abilities.

Keywords: traumatic brain injury; inpatient neurorehabilitation; situated learning; patient participation; everyday life skills

Introduction

Traumatic brain injury (TBI) is a major health problem throughout the world. In Europe, it is estimated that 33,000 persons sustain a severe TBI each year (Tagliferri et al. 2006). Despite all efforts, patients commonly reach varying outcomes (van den Broek 2005). This may be explained by the severity of the injury, but another possible contributing factor is that the current rehabilitation practice is inadequately adjusted to the need of the individual patient (Antelius 2009; Mattingly 2006; Pryor and O'Connel 2009; van den Broek 2005).

Patient participation during rehabilitation

Patients with severe TBIs are heterogeneous, and their injuries often involve different changes in physical abilities and in cognitive, emotional and/or behavioural functioning (Manly 2003; Prigatano 1999; Prigatano 2005). Rehabilitation includes regaining physical functions and the ability to reintegrate into the social, community and vocational activities (Chua et al. 2007; WHO 2003). This embraces processes of learning where patients realize the consequences and begin to create a meaningful

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daily life when taking the altered conditions into consideration. These processes also encompass feelings and embodied knowledge revealed in action which requires psychosocial rehabilitation and a professional role as a collaborator and supporter of the patient's individual process, respecting the settings in a public health care system (Schwandt 2004). Patients' participation is therefore central, both as a goal towards empowerment and a way to facilitate motivation and learning (Borg 2003; Carlson et al. 2006; Standal and Jespersen 2008; Standal, Kissow, and Morisbak 2007). This perspective and the context in which rehabilitation happens might be understood in the light of Lave and Wenger's theory of social practice and learning.

Currently, there is no unified learning theory in rehabilitation (Whyte and Hart 2003). Different explanatory frameworks are offered within the areas of behavioural-, cognitive- and social learning (Hart and Powell 2011). When considering the patients' skills shortly after a TBI and the needed skills to handle an everyday life, a broader frame of learning is needed to understand bodily, emotional and social aspects in processes of learning. In this regard, the theory of situated learning has been found valuable. However, the studies focus on patients with changes following a moderate stroke (Borg 2003; Vanetzian 1997) In this paper, we argue that the 'theory of situated learning' (Lave and Wenger 1991) is a promising theoretical perspective in relation to TBI patients as well. The aim is to discuss and illustrate how the analytical concepts 'community of practice', 'legitimate peripheral participation' and 'trajectories' can help illuminate the challenges and efforts confronting the rehabilitation professionals during rehabilitation, when the goal is to promote the patients' participation and learning.

Rehabilitation practice understood as 'situated learning'

The theory of 'situated learning' (Lave and Wenger 1991) regards the human motivation to act, think or learn as integrated in our active relation to the world. The concept is described as learning processes arising when the learner interacts with members of and participates in shared activities in a community of practice. Old-time members of a community of practice, as well as practitioners in rehabilitation a community of practice, develop over time a shared repertoire of experiences, stories, tools and ways of addressing recurring problems (Wenger 2009). Newcomers, the patients, are included in such a community to learn this kind of shared knowledge. The patient's learning is defined as 'becoming able to be involved in new activities, to perform new activities, to perform new tasks and functions, to master new understandings' (Lave and Wenger 1991, p. 53). Learning affects physical, cognitive and behavioural functions leading to changed participation in a diversity of social relations. This is a familiar challenge during rehabilitation. The rehabilitation course encompasses processes of change where the patient realizes the acquired changes and acts to create meaningfulness in daily life taking the altered conditions into consideration. Whereas this process of learning arises during the patient's participation, his commitment to the long path is required. In order to address the challenge of the patient's possible low motivation caused by the unwanted situation and lack of knowledge about what and how they need to learn during rehabilitation, the professionals need to achieve an understanding of the present conditions experienced by the patient (Mattingly and Fleming 1994). The patients' access to the community of practice is as newcomer-defined and legitimate. An asymmetry exists between the patient as newcomer and the professionals as old-timers with extended knowledge

and skills to handle everyday life after the TBI, but the community of practice is directed towards facilitating the learning process for the newcomer. The patient thereby has opportunities to gradually learn from the shared practices. In the following, selected concepts from the theory of situated learning will be further elaborated.

Community of practice

From the perspective of 'situated learning' the patient and the rehabilitation team are regarded as a 'community of practice' defined as a group of people who engage in a shared domain of interest, craft or profession in different settings. It is an intrinsic condition for the existence of knowledge (Lave and Wenger 1991). Being a member of a community of practice is founded in the ability to engage with others, understand sufficiently to participate in the practice and the capability to make a new repertoire meaningful (Wenger 2008). The professionals at a rehabilitation hospital share common knowledge, a history and a common practice of rehabilitation. Even if professionals have no subjective experiences with TBI they have seen numerous patients and experienced their reactions, challenges and efforts to gain abilities and are professionally committed to support the patients' processes of learning. This leads to common knowledge in the community which is actualized when establishing activities, surroundings and relationships reflecting a home environment, in order to promote participation (Benner 1997). The shared domain entails insight in several patients' experiences, feelings and changed functions derived from the construction of joint narratives in order to make sense during rehabilitation processes (Mattingly 1994; Mattingly and Fleming 1994). These narratives serve as a window to grasp the patient's experiences and the stories extend the shared knowledge between patients and professionals, but the common knowledge is even wider.

The characteristic of a shared domain of interest, experiences and tools vary when it comes to patients participating in the community of practice. Members are brought together by joining in common activities and by what they have learned through their mutual engagement. Following a TBI, patients acquire changes in bodily capacities, which necessitate alternative strategies in the relearning of everyday life skills. Before the injury, the patient used the surrounding objects without thinking (Toombs 2001). These experiences and knowledge might ease the process of relearning by their influence on neural plasticity. Learning tasks ought to have real-world relevance for the patient (Carey et al. 2012). Function in a context of the task for which it would normally be required impacts relearning and adjustments to deficits and injury (Coyle and Martin 2007) involving reorganization and rerouting of intracorticate pathways (Kolb, Teskey, and Gibb 2010). The patient's everyday life experiences might be similar to those of the rehabilitation professionals, fellow patients and relatives though cultural variations may exist. However, activities at a hospital have similarities to, but also differ from the patient's everyday life in a private home. In the hospital, activities are mostly physical treatments, activities of daily living and activities that foster personal well-being and being together with professionals, fellow patients and relatives. The patients may regard these activities as more meaningful in a private home, but the assessments are different within the hospital setting because the view of meaningfulness is attributed to a step-by-step process combined with the patients' experienced needs and opportunities following a severe TBI.

The patient's position and participation differ in the community. Membership is when the patient experiences that his presence influences the community of practice. During rehabilitation, membership also may be when patients participate in handling everyday life activities that they find meaningful, such as eating, maintaining hygiene, getting dressed, amusements and social interactions within a 'home-like' ward environment.

Summing up, the rehabilitating knowledge is actualized in a 'home–like' setting. Furthermore, social interaction and collaboration between professionals, relatives, fellow patients and the patient during common activities are considered as an opportunity to gain lost or changed skills. In this understanding, we claim that the rehabilitation community has clear parallels to a community of practice as described in the theory of situated learning.

Legitimate peripheral participation

The term 'legitimate peripheral participation' (LPP) emphasizes that participation is crucial for learning and providing conditions to generate relations and personal interactions. Legitimacy is underscored by the 'newcomer's' admission to the community of practice including accept and support of his need to learn on equal footing. 'LPP' conceptualizes a position from where the 'newcomer' participates and contributes with simple tasks and over time intentionally moves towards performing activities and tasks with increasing complexity (Lave and Wenger 1991; Lave 2008; Wenger 2008). Learning is also promoted when the 'newcomer' participates in information flows and conversations, in which they can make sense (Lave and Wenger 1991). In rehabilitation, the patient's LPP in the community of practice is constituted by a right to participate and acceptance of limited contributions in shared activities due to functional difficulties. The position as LPP opens for opportunities for learning lost skills, habits, attitudes and/or learns compensating strategies. Rehabilitation professionals regard it as their responsibility to create conditions that support and challenge the patients during their rehabilitation and learning process. This imperative access, cooperation and increasing participation seem consistent with the concept of LPP.

Rehabilitation as a trajectory of learning

Conditions for learning arise in a process between the patient as newcomer and old-timer members situated in a community of practice doing daily life activities (Lave and Wenger 1991; Lave 2008; Wenger 2008; Wenger 2009). Within situated learning, this process is designated as 'a trajectory'. The patient's processes of knowing, learning and transformation is shaped over time by increasing participation in practicing activities, identities, artefacts and knowledge formed by the community (Lave and Wenger 1991). The community of practice promotes the shaping of the trajectory by providing access to resources that enhance the patient's participation and involvement in actions, discussions and reflections that make a difference to the community they value (Wenger 2008). The trajectory are influenced by the patient's attitudes, values, knowledge and skills the learning trajectory and created within and across communities to make sense. The learner's intentionality underlines the importance of both past and future, which is considered when the professionals develop the learning environment.

In rehabilitation, systematic use of pictures, stories and information from relatives may provide the professionals with essential knowledge of situations or actions that patients recognize from their past and help them to discover skills to learn in order to handle the future. The professionals support the patients' participation in activities adjusted to where they are in the learning trajectory seen from their own perspective. The rehabilitation 'trajectory' entails an increasing understanding of how, when and with regard to what the community collaborates in order to handle everyday life.

In the following, we explore how systematic use of the analytical concepts within the framework of 'situated learning' may constitute an understanding of the specific pedagogical challenges that the professionals' might face in facilitating the patients' participation and learning.

Methodology

The study applied an ethnographic approach. Data was gathered from field studies of interactions between patients and professionals in ongoing rehabilitation practice supplemented by in-depth qualitative focus group interviews of rehabilitation experts carried out by the first author (Kvale and Brinkmann 2008; Spradley 1979; Spradley 1989). To strengthen the consistency and transparency of the research process, a log book was written to document strategies and decisions throughout the study (Debesay, Nåden, and Slettebø 2008; Whitehead 2004).

Field study

This paper draws on observations involving the interdisciplinary teams associated to two severely injured TBI patients. Interactions between patients and the interdisciplinary team were observed in focused field studies. Two males with severe TBI were each observed for three to four days (mornings and evenings) (Emerson 1995; Hammersley and Atkinson 2004; Hansen 1994). The inclusion criteria comprised age >18 years, severe TBI (Glasgow Coma Scale <9) and a cognitive function monitored at 66–75 at the Galveston Orientation Amnesia Test (Levin, O'Donnel, and Grossman 1979) and a Ranchos Los Amigos score at minimum 4 (Hagen 1984). Field notes, describing situations in detail and the patients' attempts or activities done in interaction with rehabilitation professionals, were written immediately after the observations (Hastrup and Ovesen 1990; Hastrup 1988; Hastrup 2003).

Focus group interview

Experiences and understanding of the ongoing rehabilitation practice from the professional team's perspective were collected in semi-structured focus group interviews (Freeman 2006; McLafferty 2004). Two focus group interviews of 1 male and 10 female rehabilitation experts representing interdisciplinary educational backgrounds and two different wards were conducted. The rehabilitation clinicians had on average six years of experience.

Field notes as well as the audio-taped group interviews were instantly transformed from talk to text. N-Vivo 9 QSR International, a qualitative research software programme, was used to store and organize data during the analysis (Bazeleley 2007).

Analysis

Data was analysed as text from a hermeneutic perspective (Gadamer 2004). First, the field notes and transcribed interviews were read to get an overall impression of what was said and done by professionals (Kvale 2003). This gave an initial understanding of the professionals' efforts to facilitate 'the motivating force in human nature to learn'. The professionals' scope of the patient's learning processes included skills, behaviour and the ability to interact: (The patient's) 'life story, values, interests, norms and approaches are important in order to identify what they want to learn' and finally learning as a contextualized working relationship: (It is) 'important he (*the patient*) can see the meaning – we vary the context to establish a realm of understanding to convey the activity to the patient'. In the light of similarities between empirical data and the situated learning theory, this might be a fruitful theoretical perspective to gain more in-depth understanding of the text. Next, the text was, therefore, analysed applying the key concepts of the situated learning theory. 'Community of practice', 'legitimate peripheral participation' and 'learning trajectory' might be rewarding to uncover and highlight professional challenges embedded in rehabilitation practice and pinpoint issues where this reflected pedagogic approach.

Ethical considerations

The study was carried out in accordance to the ethical guidelines for nursing research in the Nordic countries (Northern Nurses Federation 2003). It was reported to the Regional Committee on Biomedical Research and permission was obtained from The Danish Data Protection Agency. Informed verbal consent was obtained from the patient supplemented with surrogate informed written consent signed by the patient's closest relative. Withdrawal of the content was possible at any time without consequences for their care. All professionals gave informed written consent to participate.

Results

The following examples from both cases as well as interviews were analysed, using central analytical concepts from the theory of situated learning, in order to highlight the professional's rehabilitation efforts to promote patient participation and learning. The study took place at a rehabilitation hospital. The interdisciplinary team consisted of registered nurses, *social* and health care assistants, occupational and physiotherapists in collaboration with doctors, neurophysiologists and speech therapists etc. The professionals' aim was to make it possible for the patient to interact with different groups of professionals, fellow patients and relatives during everyday life tasks of varying complexity in each patient's rehabilitation and learning trajectory. It was in this setting that 'Kean' and 'Mike' (fictitious names) were situated, when they participated in the field study.

Kean

Thirty-six-year-old Kean had been involved in a traffic accident, following severe multi-traumas. Kean had a severe brain injury with post-traumatic amnesia for six

weeks and memory problems persisted throughout the field study. He was intermittently aware of the seriousness of his injury, was uncritical and hot-tempered. His frontal injury entailed difficulties in interacting and problem-solving activities. His left leg was fractured and the functions of his left arm and leg were moderately reduced. Although he was motivated for physical training he refused to take part in most of the daily life rehabilitating activities.

Mike

Forty-one-year-old Mike fell down a staircase. He sustained acute epidural haematoma and contusions. Mike had a severe brain injury with post-traumatic amnesia for seven weeks, and sustained serious memory problems. In a few situations he had been verbally and physically aggressive. He had dysphagia and had a nutrition tube. He was able to understand short sentences, had aphasia but answered yes or no and followed short instructions. Mike showed no initiative and was very tired. His arms and legs were hypotonic, his movements uncoordinated and his balance was reduced.

Creating a rehabilitation and learning context as a 'community of practice'

In the following, we describe the efforts of the professionals in establishing a relation, enabling a dialogue and sharing activities with the patient in order to create a rehabilitation context as a 'community of practice'; all factors which are fundamental professional tasks in the development of a rehabilitation context. A professional expresses:

> Good chemistry is essential. If we have any possibilities we use it shamelessly. It might be better with a male than a female, better with a younger than an older person or – yes we use what we can in order to reach the patient.

When the professional receives the patient, then the professional efforts are directed towards identifying common interests to generate a dialogue. 'If I know something that the patient is pleased with and usually wants to have a cosy chat — then I sometimes succeed in creating a positive atmosphere'. The interpretation of verbal and nonverbal conversations inspires the next advancement in order to 'invite the patient to a certain extent of joint activity':

> I think I might get the patient to do something or just be present. Performance is not necessary, only that they want to participate in a meaningful basic activity. Now I am thinking of some of the lowest levels of activity concerning human needs.

The explication of lower levels of activities might indicate professional reflexions concerning conducting achievable activities taking the patients' position as new in the community and his changed abilities to engage into consideration.

This illustrates that the interdisciplinary teams intend to create a rehabilitation context with features of inclusion, shared activity and interaction similar to the descriptions of a 'community of practice'. In the following, we explore how their expressed knowledge, values and skills became visible in practice.

We begin by exploring a situation that occurred as Kean was assisted to transfer from a chair to a bed to have a rest. In similar situations he was observed to be irritated when asked to move slowly or reminded not to use or alleviate the pressure on his fractured leg. The professional prepared for his movement by placing the bed and chair in accordance with the photographic guidelines professionals had designed for the team so that Kean could experience identical interpersonal procedures each time in the same sequence. In a calm voice, the professional reminded him:

> Please remember to move slowly so you don't fall out of the chair. You have already tricked me once' she smiles and her tone is humoristic. Kean addresses her directly and with a firm voice says 'no I do not' and later sneers at her 'are you ready or have you got stuck'.... Apparently Kean participates in moving, but he ignores her guidance and mumbles, so that his tone is difficult to interpret. Kean says that the movement is taking too long especially when she comments 'you are going too fast – too fast. We prefer quality to quantity' Kean is irritated and spells out the word Q-U-A-L-I-T-Y followed by an inaudible sentence. A few minutes later he is asleep.

From a perspective of situated learning, the professional tries to engage Kean in a joint activity by encouraging and supporting his participation, while compensating for his acquired difficulties. Her humoristic tone indicates that Kean's well-being is the starting point for their interaction and his initial cooperation reflects their relationship and a mutual objective. Her guidance is based on professional assessments and experiences and seeks to direct him to participate, while at the same time maintaining his security. Kean's physiological limitations explain the necessity of placing the chair by the bed to minimize the physical requirements for the movement, and he has to recognize and recall the procedure in order to participate. Kean interprets the activity and the professional's intensions as a meaningful activity and seeks to move to contribute, but he is not fully conscious of his injury and is unaware of the security risk. Kean initiates the movement, and the professional intervenes to prevent a risky situation from occurring, and Kean's attempted contribution to the activity fails. Shared activities in the community of rehabilitation often relates to daily recurrent tasks as hygiene, dressing, having meals or leisure activities. The professional experts put forward a hypothesis concerning activities that the patient as newcomer in the community might experience meaningful to learn in order to experience well-being or reduce his dependency. Collaboration between members of the community provides learning conditions for both the professionals and the patient in the step-by-step process in accomplishing the task. However, data also highlight unsolved problems concerning the patients' ability to understand sufficient of the practice to participate. The professionals' challenges involve both difficulties in terms of including patients in activities and the immense complexity experienced when inviting patients to participate in shared activities to promote their participation and learning.

The patient as a legitimate peripheral participant in the rehabilitation community

The patient's access to the community of rehabilitation is obvious, but inclusive efforts were expressed as fundamental. 'We make a joined assessment of what we observe among the patient and put forward a hypothesis of what might work. We make a note and everybody tries to act this way when interacting with the patient'. The quote illustrates that the positive atmosphere is a reflected part of inclusion in

the rehabilitation environment. Shared interests between participants seem to facilitate the newcomer's agreement as a sort of collaboration. A professional expressed: 'We try to identify what might increase the patient's interest to add just a little more in order to make just a little meaningfulness visible to the patient. Positively it might be used to get them to agree to some of the "must activities in an everyday life". The patient's response may be a refusal followed by developing a new hypothesis or it might be a step towards increased participation as intended by the professional'.

In the following, we use data from the field studies to illustrate the professional efforts in order to create a learning environment to the LPP as newcomer in the community of practice. When the professionals intended to promote Kean's participation, they seemed to conduct simple standardized activities known by the patient before the injury; for instance preparing for movement:

> Before all the transfers from and to the wheel chair Kean was instructed. He was ready to move and tried to establish eye contact. Every transfer was done in absolutely the same way using the same positions and actions, instructed and physically supported by professionals. She kindly asked: 'At which leg do you have to avoid body weight'? Immediately Kean answered 'left'. He was smiling. 'Fine' – please stand up. He briefly considered. Then he seized the bed and stood up with his left leg raised.

Kean as 'newcomer' used the created path for participation and learned some elements of a simple activity:

> The professional praised and instructed in short terms –'fine, wait, then you can turn around SLOWLY and then you can sit down'. In short moments the tone was sharp and commanding because Kean began to move before all preparations had been finished. Kean was encouraged, supervised and compensated by the professional. His tempo might be an expression of his wish to be helpful and contribute to the activity.

By his contributions to the activity, he obtained admission to experience and gradually learn how to transfer safely when taking his physical changes into consideration.

Another example was a professional who acted to include, promote and challenge Mike in a joint everyday activity:

> 'Your T-shirt is wet, and I think we have to change it'. She draws it above his head and gives him another T-shirt. It is unfolded with the front up and the neckline close to him. 'Can you find up and down at this one'? Mike attempts to get the T- shirt on, but fails and gets his hand through the neckline. She stops him and assists. Gently she guides his hands into the sleeves. Mike tries to lift the T-shirt over his head but the professional needs to assist the movement. The professional asks: 'Is it sitting as you want'? Mike nods while they have eye contact.

Mike's well-being is central in the dialogue and his reaction indicates that they have a relationship and a mutual engagement. The professional suggests the activity aimed at both his well-being and his pre-injury experiences about dressing. She suggests a joint activity by using the phrase 'we have to change it'. Mike understands the wet shirt and her verbal and non-verbal intensions as a meaningful activity shown by his intension of contribution. The way she offers Mike the new shirt is explained in her aim of inclusion. She reflects on his physiological and cognitive abilities to recognize

the shirt, its placement, how to get in on and further his mobility and puts forward a hypothesis in placing the shirt in his lap. With the shirts front up and neckline closest, Mike first has to recognize it as a garment and further decide how the shirt must be placed to get the front at his chest. Mike initiates the dressing. The professional awaits, guides and intervenes to prevent failed attempts. In this way, she aims to include Mike in the 'community of practice' to participate in a joint activity that may challenge his changed physical and cognitive abilities to contribute. Through LPP, the 'newcomer' acquires the culture of practice and the community of practice includes the 'newcomer'. In contrast, refused or limited access will inhibit the possibility to learn. In the following, we describe examples where the position of LPP is challenged by the patients changed abilities in doing daily life activities.

In rehabilitation, creating an 'inclusive practice' becomes crucial for the patients due to the close connection between possibilities for learning and membership of the community of practice.

A professional describes: 'We try many different roles in interacting – try to run the process, omit to manage – try different strategies and initiatives'. The patients often have changed cognitive and physical abilities, which impede their participation in the existing community, especially because participation takes place within a hospital culture and environment. The professional challenge seems persistent during the rehabilitation course: 'Establishing contact to the patient in order to initiate things is difficult. From day to day it can differ how the strategy works'. Even though the patients are given access to the community of practice, they only engage when they share the interests with the community and regard the common activity as meaningful. Creating meaningfulness seems to be essential in conducting rehabilitation activities:

> He is interested in basketball as we try to oblige by having something he can sling but not hit too hard .... It is about finding some elements of interests as you are allowed to built on a little so he can see the meaning.

Even if the starting point is the patients' interests and preferences, inclusion may fail, as the following example illustrates: Professional: 'Is there anything you want to do'? Kean: 'It has to be something functional. Something I normally do at work. I can do everything with both sides, but left arm still needs training' and later 'when I get up I get dizzy and my legs can't keep up'. Kean's awareness of his own situation is limited. From his perspective, the rehabilitation activities may seem meaningless when the need for rehabilitation is not perceived. His expressed meaningful activities are related to his previous job. The professional, on the other hand, considers activities of daily living meaningful, due to his challenges. He refuses to take part in activities and conversations when the domain has no interest, as further highlighted in the next situation:

> Kean accepted to follow the professional to the kitchen to whip some cream. In the kitchen the professional asks if he will whip the cream. Kean looks at her and answers the question with a clear voice 'NO I will not'. She asks why and Kean gives the reason 'I have a wife to do that at home'. She accepts his refusal and asks 'but you will watch?' Kean accepts.

Kean's access to participate in a shared activity is confirmed by the professional, but he refuses due to conflicting opinions about rehabilitation needs and what constitutes

a meaningful activity. He disputes participation unless on his own terms, unaware of the professional's aim to stimulate his cognitive rehabilitation by taking part in a recognizable and simple activity carried out in a kitchen and with tools similar to those available at home. For Kean, these apparent conflicting understandings and goals may reduce his willingness and efforts to contribute to the activity, thereby reducing his learning opportunities. This highlights the importance of offering meaningful activities in order to encourage participation.

According to the theory of 'situated learning', patients' access to the community of practice is crucial to obtain learning. However, the abovementioned example indicates that providing access alone is inadequate to include patients with TBI. Consequently, the professional members of the community of practice need to develop more systematic strategies of eliciting the patients' interest in participation and to enable them to participate on their own terms. This means that the professionals have to offer activities that are regarded as meaningful in order to make participation in the community of practice attractive and suitable for the individual patient.

Rehabilitation as a learning trajectory

The 'newcomer's experiences obtained during his participation in shared practices shape the trajectory in and across different communities according to what makes sense to him. Therefore, the trajectory illustrates the learning process over a period of time characterized by increasing the understanding of how, when and what a community collaborates on, its values and rules (Lave and Wenger 1991).

In this study, the rehabilitation professional's expressions indicate an understanding of rehabilitation as a process of learning aimed at acquiring skills of increasing complexity. A professional expresses:

> I think we observe where it goes well – what we are going to do in order to see the patient goes further in the activity- that is when he succeed in doing the activity. This is what we have to base on . . . so they have some good experiences and next we can say 'now we are going to try something a bit more complicated'.

They express it as their task to create conditions that support and challenge the patients during rehabilitation towards the overall goal of handling everyday life after the injury. They reflect on both the distribution of roles in the interaction as well as the complexity of activity in their collaboration with the patient. A professional describes: 'We must be able to grade the activity we perform. For instance we sometime need to be more dominating while we in other situations give free rein in order to involve the patient'. Another supplement: 'We assess the grade of help needed by the patient in order to succeed and according to the complexity of the activity'.

An aspect of complexity is the amount of stimuli from the surrounding environment. Initially, the patients are provided with the opportunity to complete simple activities, such as eating served food in their room with the door closed, in order to reduce disturbances from the environment. The following examples illustrate Kean's learning trajectory: The professional: 'Then there is rice pudding for you and a glass of water' Kean: 'Thank you, that sounds good'. She arranges the plate in front of him and hands him a spoon for taking with his right hand.

Professional: 'Would you like me to find a napkin'? Kean: 'Yes thank you' He is already eating. She assesses that he is sitting badly in relation to the activity of eating. She observes his position and asks: 'Don't you need to get closer to the table?' Kean refuses: 'No thank you' then followed by something unintelligible caused by a lot of food in his mouth. She supports him: 'Just take the time you need to eat. There is no need to hurry'. Kean: 'No' and then while he continues to put food in his mouth. 'It is best hot'. He continues to eat, his attention fixed on the plate. He drops food from his mouth and his breathing indicates swallowing problems. She says 'Now I will leave you. I can see that I am disturbing your meal'. She sits silently on a stool just behind him to reduce disturbances. He doesn't comment but continues to eat – perhaps a little slower. Kean participates by using his physical skills. His safety and dignity is threatened and the professional compensates by seeking to reduce the speed with which he eats. Her guidance is ignored and she changes strategy. She assesses that his participation is disturbed by excessive stimulation from the environment and reduces the amount of stimuli by moving out of his sight and being quiet in order to promote his participation.

After a few days Kean has progressed and eats his dinner in the dining room with other patients and professionals. In this situation, different learning challenges occur:

> There are 6 places at the dining table. Kean is seated closest to the corridor with his back towards the kitchen. Kean shows obvious interest in the other patients and whether they are enjoying their dinner. Addressing one of them he comments: 'It tastes good doesn't it?' She doesn't answer but the professional confirms: 'Yes X appreciates good food'. Kean eats slowly while observing a fellow patient, who is challenged by eating.

The social elements in the dinner situation raise Kean's attention towards interpersonal interaction. His intentionality moves him towards increasing participation in complex activities, and in this situation the complexity is constituted of both the activity itself and the surrounding environment. The situation and the activity are known to Kean, while the environment is highly complex due to several sensory impressions. To support Kean's participation and to compensate for his acquired difficulties, the rehabilitation professional expresses current norms through questions, and indirectly she seeks to involve him in ethical considerations concerning the integrity of both Kean and the other patients, by answering unanswered questions addressed to other patients. Kean seems to recognize the dinner situation's conversation, but his cognitive changes might prevent him from perceiving the social norms in the situation.

Another example of increasing complexity is constituted by the activity. Mike is at the bathroom lying on a couch. His confusion and physical changes influence his participation. The shared activity is quite simple but the support and compensation from the professional is obvious:

> The professional puts shampoo in his hair. He recognises and lifts his left hand towards his head. P guides his right hand to the hair and passes it in the wash movements. Then he loses the movement of left hand but resumes when assisted. For a short period he continues.

In the assessment of Mike's need for support, the professional interprets his efforts towards his normal patterns of movement by stimulating his affected arm and his

ability to maintain and complete the activity by initiating the requested movements. She omitted to speak but guided by movements in order to minimize disturbances and challenged his cognitive abilities by letting him recognize the shampoo. Her hypothesis in choosing activity and complexity in the environment facilitated Mike's participation in this situation. This might be followed up by a new hypothesis of kindness and degree of increased complexity.

Discussion

The deliberate pedagogical approach suggested in the 'situated learning' theory (Lave and Wenger 1991) highlights important considerations about the learning involved in clinical rehabilitation of people with severe TBI. The systematic use of these analytical learning concepts may support rehabilitation professionals in facilitating and challenging patient participation and learning during the rehabilitation process.

By viewing the rehabilitation environment as an inclusive working community of practice addressing the patients as legitimate peripheral participants, we achieve valuable analytical concepts to improve our professional analyses and reflections aimed at promoting the patients' own efforts progressing from participation in routines of, for example, hygiene to complex problem-solving activities (Jenkins and Brotherton 1995; Lave and Wenger 1991). Interactions intended to achieve mutual respect and well-being are fundamental to provide a context conducive for learning (Lave 1997; Wenger 2008). The patients' opportunity to learn arises when interacting in and across a community of professionals, other patients and relatives, participating in the flow of routines, and individual and joint activities going on in the rehabilitation setting. The professional rehabilitation community is constituted to promote rehabilitation and therefore the patients' membership is definitive.

However, admission as LPP is not sufficient to involve patients who may have a limited realization of the injury, and of cognitive and physical changes. Promoting inclusion becomes a task for the community, which is obliged to create a positive atmosphere. Furthermore, the joint activities are provided and tailored to the patients' physical and cognitive abilities to participate. Even though the patients intend to participate, changes after a TBI may prevent them from obtaining the correct information, and to understand enough to contribute and additionally to recall and perform new skills (Lave and Wenger 1991).

In facilitating the trajectory of learning, participation in provided activities of increasing complexity is crucial. Rehabilitation activities must be recognized by the patients and be experienced as meaningful, but at the same time they may bridge the process of gaining lost skills or changed strategies to make participation in the community of practice suitable (Lave and Wenger 1991; Lave 1997; Wenger 2008), These gender- and age-dependent variations may be a challenge in a hospital environment primarily designed to reflect a home, while activities related to work or leisure activities may be experienced as more valuable, particularly for young males who comprise the majority of the patients. The community of practice needs to develop new strategies in order to make participation feasible and encourage involvement of the patient.

The presented empirical example illustrates recognizable challenges in rehabilitation practice. Studies claim that ongoing rehabilitation practice is inadequately tailored to the rehabilitation needs of individual patients and the complexities involved in intensive neurorehabilitation are not consistently addressed (Antelius

2009; Mattingly 2006; Pryor and O'Connel 2009; van den Broek 2005). Situated learning theory contributes by visualizing that the pedagogic challenge in neurorehabilitation is twofold: It encompasses creating a learning environment to facilitate the patient in gaining or compensating for changed functional abilities to participate as well as assisting the patient to learn or compensate for changed everyday life competencies (Lave and Wenger 1991; Lave and Wenger 2005; Wenger 2008). Therefore, the analytical situated learning concepts constitute a perspective to systematize and improve the patients' participation in rehabilitation practice and may facilitate the development of conditions that foster the patients' gaining of abilities congruent with their own needs and priorities. However, the theory needs to be supplemented by considering the diversity of changed abilities of participation in creating the optimal conditions for learning. The analytical concepts from situated learning theory leave unsolved questions concerning the heterogeneous changes following a TBI influencing the patients' ability to seek participation, to understand enough to contribute and additionally to recall and perform new skills. Consequently, further work is needed to make the analytical concepts suitable to clinical intensive neurorehabilitation practice.

There are limitations to this explorative study. It was conducted at a highly specialized neurorehabilitation hospital observing two patients and interviewing 11 rehabilitation experts. This limits the variation of the data and the transferability of the findings. Although participation to learn has been described as a promising practice (Carlson et al. 2006), neurorehabilitation practice regarded from this perspective seems sparse. Within health care, the use of situated learning is limited and tends to focus on the professionals' acquisition of knowledge and skills (Li et al. 2009). This study contributes with considerations that may support the development of frameworks to guide specific intervention strategies to promote the rehabilitation process.

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