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Expansive Learning at Work: toward an activity theoretical reconceptualization

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ABSTRACT *Cultural-historical activity theory has evolved through three generations of research. The emerging third generation of activity theory takes two interacting activity systems as its minimal unit of analysis, inviting us to focus research efforts on the challenges and possibilities of inter-organizational learning. Activity theory and its concept of expansive learning are examined with the help of four questions: 1. Who are the subjects of learning? 2. Why do they learn? 3. What do they learn? 4. How do they learn? Five central principles of activity theory are presented, namely activity system as unit of analysis, multi-voicedness of activity, historicity of activity, contradictions as driving force of change in activity, and expansive cycles as possible form of transformation in activity. Together the four questions and five principles form a matrix which is used to present a study of expansive learning in a hospital setting in Finland. In conclusion, implications of the framework for our understanding of the increasingly important horizontal dimension of learning are discussed.*

Introduction

Any theory of learning must answer at least four central questions: (1) Who are the subjects of learning, how are they defined and located?; (2) Why do they learn, what makes them make the effort?; (3) What do they learn, what are the contents and outcomes of learning?; and (4) How do they learn, what are the key actions or processes of learning? In this paper, I will use these four questions to examine the theory of expansive learning (Engeström, 1987) developed within the framework of cultural-historical activity theory.

Before going into expansive learning, I will briefly introduce the evolution and five central ideas of activity theory. The four questions and the five principles form a matrix which I will use to systematize my discussion of expansive learning.

I will concretize the theoretical ideas of this paper with the help of examples and findings from an ongoing intervention study we are conducting in the multi-organizational field of medical care for children in the Helsinki area in Finland. After presenting the setting and the learning challenge it was facing, I will discuss each of the four questions in turn, using selected materials from the project to highlight the answers offered by the theory of expansive learning.

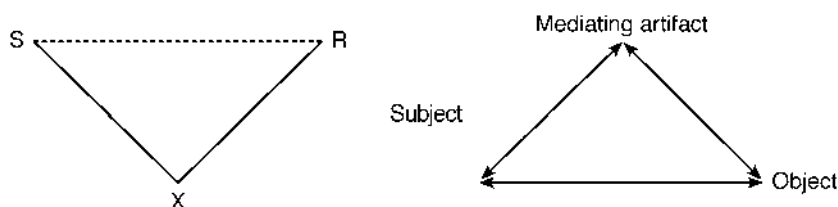


FIG. 1. (A) Vygotsky's model of mediated act and (B) its common reformulation.

I will conclude by discussing the implications of the theory of expansive learning for our understanding of directionality in learning and development.

Generations and Principles of Activity Theory

Cultural-historical activity theory was initiated by Lev Vygotsky (1978) in the 1920s and early 1930s. It was further developed by Vygotsky's colleague and disciple Alexei Leont'ev (1978, 1981). In my reading, activity theory has evolved through three generations of research (Engeström, 1996). The first generation, centered around Vygotsky, created the idea of *mediation*. This idea was crystallized in Vygotsky's (1978, p. 40) famous triangular model in which the conditioned direct connection between stimulus (S) and response (R) was transcended by 'a complex, mediated act' (Figure 1A). Vygotsky's idea of cultural mediation of actions is commonly expressed as the triad of subject, object, and mediating artifact (Figure 1B).

The insertion of cultural artifacts into human actions was revolutionary in that the basic unit of analysis now overcame the split between the Cartesian individual and the untouchable societal structure. The individual could no longer be understood without his or her cultural means; and the society could no longer be understood without the agency of individuals who use and produce artifacts. This meant that objects ceased to be just raw material for the formation of logical operations in the subject as they were for Piaget. Objects became cultural entities and the object-orientedness of action became the key to understanding human psyche.

The limitation of the first generation was that the unit of analysis remained individually focused. This was overcome by the second generation, centered around Leont'ev. In his famous example of 'primeval collective hunt' (Leont'ev, 1981, pp. 210–213) Leont'ev explicated the crucial difference between an individual action and a collective activity. However, Leont'ev never graphically expanded Vygotsky's original model into a model of a collective activity system. Such a modeling is depicted in Figure 2.

The uppermost sub-triangle of Figure 2 may be seen as the 'tip of the iceberg' representing individual and group actions embedded in a collective activity system. The object is depicted with the help of an oval indicating that object-oriented actions are always, explicitly or implicitly, characterized by ambiguity, surprise, interpretation, sense making, and potential for change.

The concept of activity took the paradigm a huge step forward in that it turned the focus on complex interrelations between the individual subject and his or her

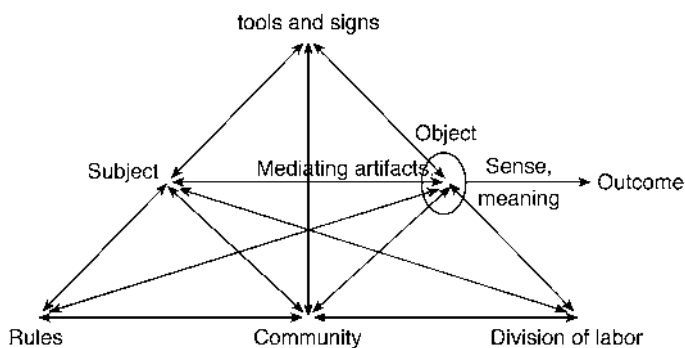


FIG. 2. The structure of a human activity system (Engeström, 1987, p. 78).

community. In Soviet Union, the societal activity systems studied concretely by activity theorists were largely limited to play and learning among children, and contradictions of activity remained an extremely touchy issue. Since the 1970s, the tradition was taken up and recontextualized by radical researchers in the west. New domains of activity, including work, were opened up for concrete research. A tremendous diversity of applications of activity theory began to emerge, as manifested in recent collections (e.g. Chaiklin *et al.*, 1999; Engelsted *et al.*, 1993; Engeström *et al.*, 1999; Nardi, 1996). The idea of internal contradictions as the driving force of change and development in activity systems, so powerfully conceptualized by Il'enkov (1977, 1982), began to gain its due status as a guiding principle of empirical research.

Ever since Vygotsky's foundational work, the cultural-historical approach was very much a discourse of vertical development toward 'higher psychological functions'. Luria's (1976) cross-cultural research remained an isolated attempt. Michael Cole (1988; see also Griffin & Cole, 1984) was one of the first to clearly point out the deep-seated insensitivity of the second generation activity theory toward cultural diversity. When activity theory went international, questions of diversity and dialogue between different traditions or perspectives became increasingly serious challenges. It is these challenges that the third generation of activity theory must deal with.

The third generation of activity theory needs to develop conceptual tools to understand dialogue, multiple perspectives, and networks of interacting activity systems. Wertsch (1991) introduced Bakhtin's (1981, 1986) ideas on dialogicality as a way to expand the Vygotskian framework. Ritva Engeström (1995) went a step further by pulling together Bakhtin's ideas and Leont'ev's concept of activity. Notions of activity networks (e.g., Russell, 1997) are being developed, and a discussion between activity theory and Latour's (1993) actor-network theory has been initiated (Engeström & Escalante, 1996; Miettinen, 1999). The concept of boundary crossing is being elaborated within activity theory (Engeström *et al.*, 1995). For example, Gutierrez and her co-authors (Gutierrez *et al.*, 1995; Gutierrez *et al.*, 1999) suggest the concept of 'third space' to account for events in classroom discourse where the seemingly self-sufficient worlds and scripts of the teacher and

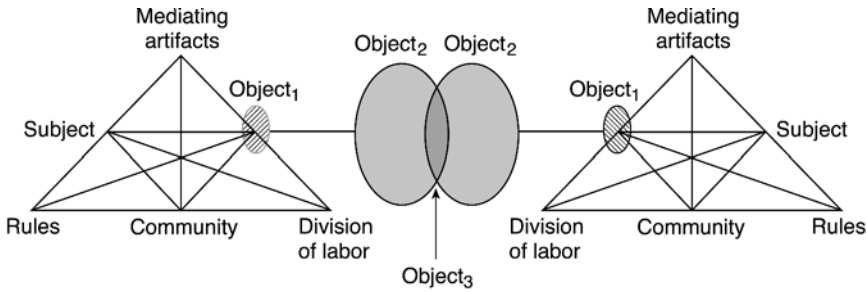


FIG. 3. Two interacting activity systems as minimal model for the third generation of activity theory.

the students occasionally meet and interact to form new meanings that go beyond the evident limits of both.

These developments indicate that the door is open for the formation of the third generation of activity theory. In this mode of research, the basic model is expanded to include minimally two interacting activity systems (Figure 3).

In Figure 3, the object moves from an initial state of unreflected, situationally given ‘raw material’ (object 1; e.g., a specific patient entering a physician’s office) to a collectively meaningful object constructed by the activity system (object 2, e.g., the patient constructed as a specimen of a biomedical disease category and thus as an instantiation of the general object of illness/health), and to a potentially shared or jointly constructed object (object 3; e.g., a collaboratively constructed understanding of the patient’s life situation and care plan). The object of activity is a moving target, not reducible to conscious short-term goals.

In its current shape, activity theory may be summarized with the help of five principles (for earlier summaries, see Engeström, 1993, 1995, 1999a). *The first principle* is that a collective, artifact-mediated and object-oriented activity system, seen in its network relations to other activity systems, is taken as the prime unit of analysis. Goal-directed individual and group actions, as well as automatic operations, are relatively independent but subordinate units of analysis, eventually understandable only when interpreted against the background of entire activity systems. Activity systems realize and reproduce themselves by generating actions and operations.

The second principle is the multi-voicedness of activity systems. An activity system is always a community of multiple points of view, traditions and interests. The division of labor in an activity creates different positions for the participants, the participants carry their own diverse histories, and the activity system itself carries multiple layers and strands of history engraved in its artifacts, rules and conventions. The multi-voicedness is multiplied in networks of interacting activity systems. It is a source of trouble and a source of innovation, demanding actions of translation and negotiation.

The third principle is historicity. Activity systems take shape and get transformed over lengthy periods of time. Their problems and potentials can only be understood against their own history. History itself needs to be studied as local history of the activity and its objects, and as history of the theoretical ideas and tools that have

shaped the activity. Thus, medical work needs to be analyzed against the history of its local organization and against the more global history of the medical concepts, procedures and tools employed and accumulated in the local activity.

The fourth principle is the central role of contradictions as sources of change and development. Contradictions are not the same as problems or conflicts. Contradictions are historically accumulating structural tensions within and between activity systems. The primary contradiction of activities in capitalism is that between the use value and exchange value of commodities. This primary contradiction pervades all elements of our activity systems. Activities are open systems. When an activity system adopts a new element from the outside (for example, a new technology or a new object), it often leads to an aggravated secondary contradiction where some old element (for example, the rules or the division of labor) collides with the new one. Such contradictions generate disturbances and conflicts, but also innovative attempts to change the activity.

The fifth principle proclaims the possibility of expansive transformations in activity systems. Activity systems move through relatively long cycles of qualitative transformations. As the contradictions of an activity system are aggravated, some individual participants begin to question and deviate from its established norms. In some cases, this escalates into collaborative envisioning and a deliberate collective change effort. An expansive transformation is accomplished when the object and motive of the activity are reconceptualized to embrace a radically wider horizon of possibilities than in the previous mode of the activity. A full cycle of expansive transformation may be understood as a collective journey through the *zone of proximal development* of the activity:

It is the distance between the present everyday actions of the individuals and the historically new form of the societal activity that can be collectively generated as a solution to the double bind potentially embedded in the everyday actions. (Engeström, 1987, p. 174)

When the five principles outlined above are cross-tabulated with the four questions I presented at the beginning of this paper, we arrive at the following matrix (Figure 4). The matrix will serve as framework for summarizing the answers offered by the theory of expansive learning.

Expansive Learning—A New Approach

Standard theories of learning are focused on processes where a subject (traditionally an individual, more recently possibly also an organization) acquires some identifiable knowledge or skills in such a way that a corresponding, relatively lasting change in the behaviour of the subject may be observed. It is a self-evident presupposition that the knowledge or skill to be acquired is itself stable and reasonably well defined. There is a competent ‘teacher’ who knows what is to be learned.

The problem is that much of the most intriguing kinds of learning in work organizations violates this presupposition. People and organizations are all the time learning something that is not stable, not even defined or understood ahead of time.

	Activity system as unit of analysis	Multi- voicedness	Historicity	Contradictions	Expansive cycles
Who are learning?					
Why do they learn?					
What do they learn?					
How do they learn?					

FIG. 4. Matrix for the analysis of expansive learning.

In important transformations of our personal lives and organizational practices, we must learn new forms of activity which are not yet there. They are literally learned as they are being created. There is no competent teacher. Standard learning theories have little to offer if one wants to understand these processes.

Gregory Bateson's (1972) theory of learning is one of the few approaches helpful for tackling this challenge. Bateson distinguished between three levels of learning. Learning I refers to conditioning, acquisition of the responses deemed correct in the given context—for instance, the learning of correct answers in a classroom. Bateson points out that wherever we observe Learning I, also Learning II is going on: people acquire the deep-seated rules and patterns of behavior characteristic to the context itself. Thus, in classrooms, students learn the 'hidden curriculum' of what it means to be a student: how to please the teachers, how to pass exams, how to belong to groups, etc. Sometimes the context bombards participants with contradictory demands: Learning II creates as double bind. Such pressures can lead to Learning III where a person or a group begins to radically question the sense and meaning of the context and to construct a wider alternative context. Learning III is essentially a collective endeavor. As Bateson points out, processes of Learning III are rare and dangerous:

Even the attempt at Level III can be dangerous, and some fall by the wayside. These are often labeled by psychiatry as psychotic, and many of

them find themselves inhibited from using the first person pronoun. (Bateson, 1972, pp. 305–306)

Bateson's conceptualization of Learning III was a provocative proposal, not an elaborated theory. The theory of expansive learning develops Bateson's idea into a systematic framework. Learning III is seen as learning activity which has its own typical actions and tools (these will be discussed later in this paper). The object of expansive learning activity is the entire activity system in which the learners are engaged. Expansive learning activity produces culturally new patterns of activity. Expansive learning at work produces new forms of work activity.

The Learning Challenge in Children's Health Care in Helsinki

In Finland, public health care services are principally funded by taxation and the patient typically pays a nominal fee for a visit. A critical structural issue in the Helsinki area is the excessive use of high-end hospital services, historically caused by a concentration of hospitals in this area. In children's medical care, the high-end of medicine is represented by the Children's Hospital which has a reputation of monopolizing its patients and not actively encouraging them to use primary care health center services. Due to rising costs, there is now much political pressure to change this division of labor in favor of increased use of primary care services.

The problem is most acute among children with long-term illnesses, especially those with multiple or unclear diagnoses. Children with asthma and severe allergies are a typical and rapidly growing group. Such children often drift between caregiver organizations without anyone having overview and overall responsibility of the child's care trajectory. This puts a heavy burden on the families and on the society.

The Children's Hospital decided to respond to the pressures by initiating and hosting a collaborative redesign effort, facilitated by our research group using a method called *Boundary Crossing Laboratory*. Approximately 60 invited representatives of physicians, nurses, other staff, and management from primary care health centers and hospitals responsible for children's health care in the Helsinki area met in ten three-hour sessions, the last one of which was held in mid-February 1998. The participants viewed and discussed a series of patient cases videotaped by the researchers. The cases demonstrated in various ways troubles caused by lack of coordination and communication between the different care providers in the area. The troubles took the form of excessive numbers of visits, unclear loci of responsibility, and failure to inform other involved care providers (including the patient's family) of the practitioner's diagnoses, actions and plans.

The learning challenge in this setting was to acquire a new way of working in which parents and practitioners from different caregiver organizations will collaboratively plan and monitor the child's trajectory of care, taking joint responsibility for its overall progress. There was no readily available model that would fix the problems; no wise teacher had the correct answer.

Who and Where are the Subjects of Learning?

This learning challenge could not be met by training individual practitioners and parents to adopt some new skills and knowledge. The issue at stake was organizational, not resolvable by a sum total of separate individuals.

On the other hand, there was no mythical collective subject that we could approach and push to take charge of the transformation. Top-down commands and guidelines are of little value when the management does not know what the content of such directives should be. The management of the Children's Hospital—as competent and experienced as it was—was conscious of its own limitations in the situation and asked us to help.

Recent theories of situated learning (Lave & Wenger, 1991; Wenger, 1998) and distributed cognition (Hutchins, 1995) tell us to look for well-bounded *communities of practice* or *functional systems*, such as task-oriented teams or work units, to become collaborative subjects of learning. In a similar vein, Suchman (1997) would recommend that we focus our attention on *centers of coordination* of this activity. But in the multi-organizational field of children's medical care in Helsinki, there is no well-bounded work unit that could conceivably be the center of coordination. In each individual patient case, the combination of institutions, specialties and practitioners involved in the delivery of care is different, and it is seldom possible to name a stable locus of control. The center does not hold (Engeström *et al.*, 1999).

Latour's (1987, 1996) *actor-network* theory recommends that we locate learning in a heterogeneous network of human and non-human actors. This is fine, but Latour's principle of generalized symmetry turns all the actors (or actants, as he prefers to call them) into black boxes without identifiable internal systemic properties and contradictions. If we want to successfully confront the various actors involved in the care, we must be able to touch and trigger some internal tensions and dynamics in their respective institutional contexts, dynamics that can energize a serious learning effort on their part.

In our case, learning needs to occur in a changing mosaic of *interconnected activity systems* which are energized by their own inner contradictions. A minimal constellation of activity systems includes the activity system of the Children's Hospital, the activity system of the primary care health center, and the activity system of the child's family. In each particular patient case, the specific instantiation of the three activity systems is different. Yet, the general structural characteristics and network positions of each one of them remain sufficiently stable to allow analysis and redesign.

In the Boundary Crossing Laboratory, the basic constellation of the three activity systems was implemented so that hospital practitioners sat at one side of the room and primary care health center practitioners sat on another side of the room. The voices of patients' families came from the front of the room, from videotapes made by following patients through their hospital and health center visits and also from actual parents we invited to join in the sessions.

In the first session of the Boundary Crossing Laboratory, we presented the case of a prematurely born boy who was suffering from asthma symptoms and repeated

respiratory infections. His care had been initiated at the Children's Hospital in August. By mid-November, his personal physician at the health center had not received any information on the initiation of hospital care or on plans for continued care. As the health center personal physician was unable to attend the Laboratory session in person, we showed her videotaped interview to the participants. The personal physician's use of reported speech—borrowing the voice of an imagined hospital physician—made her statement particularly poignant.

Excerpt 1 (Boundary Crossing Laboratory, Session 1)

Interviewer: I'm thinking to myself, would there be any room for negotiation, I mean, is it always so that one-sidedly one party, the hospital, decides that OK, now this is at such a stage that we can send him to primary care ... Is there any discussion on this?

Personal physician: Nobody has ever asked me, 'Would you take this patient for follow-up?' But then again, I am not specialized in pediatrics.

In the Laboratory session, practitioners from the Children's Hospital by and large denied that patient information is not sent to the health centers and maintained that the papers must have gotten lost at the health center. Health center practitioners on the other hand claimed that it was in fact common that Children's Hospital would not send patient papers to the health center. In other words, at this point the multivoicedness of the interaction took the shape of interlocking defensive positions. Toward the end of the first session, the head physician of Children's Hospital opened a first crack in the defensive deadlock.

Excerpt 2 (Boundary Crossing Laboratory, Session 1)

Head physician of Children's Hospital: ... And here I think we now have a pretty obvious issue, we just have to ask whether the patient record is actually sent to the primary care.

While expansive learning was firmly distributed within and between the three key activity systems, actions like the one taken by the head physician demonstrate that individual agency is also involved. However, different individuals speaking in different voices take the leading subject position in the activity at different moments. The leading subject role and agency is not fixed, it keeps shifting.

We may now summarize the answers of the theory of expansive learning to the first question of the matrix (Figure 5).

Why do They Learn—What Makes Them Make the Effort?

For situated learning theory (Lave & Wenger, 1991), motivation to learn stems from participation in culturally valued collaborative practices in which something useful is produced. This seems a satisfactory starting point when we look at novices gradually

	Activity system as unit of analysis	Multi- voicedness	Historicity	Contradictions	Expansive cycles
Who are learning?	Interconnected activity systems hospital, health center, patient's family	Voices of specialized hospital care, general primary care and lay home care			
Why do they learn?					
What do they learn?					
How do they learn?					

FIG. 5. Answers to the first question.

gaining competence in relatively stable practices. However, motivation for risky expansive learning processes associated with major transformations in activity systems is not well explained by mere participation and gradual acquisition of mastery.

As I pointed out earlier, Bateson (1972) suggested that expansive Learning III is triggered by double binds generated by contradictory demands imposed on the participants by the context. In the Boundary Crossing Laboratory, we made the participants face and articulate the contradictory demands inherent in the their work activity by presenting a series of troublesome patient cases captured on videotape. In several of these cases, the patient's mother was also present. This made it virtually impossible for the participants to blame the clients for the problems and added greatly to the urgency of the double bind. Despite overwhelming evidence, the acknowledgement and articulation of the contradictions was very difficult for the practitioners. The first statements to that effect began to emerge in the third session of the Boundary Crossing Laboratory.

Excerpt 3 (Boundary Crossing Laboratory, Session 3)

Hospital nurse: A chronically ill child who has several illnesses does not necessarily have a clearly defined physician in charge. The care is fragmented. The information is terribly fragmented in the patient's medical record. It is not necessarily easy to draw

conclusions as to what has happened to this child in the previous visit, not to speak of finding information about visits to another hospital, for example what shared guidance and counseling practices the family would need. And one doesn't necessarily even find information on the current medications. They are merely in the parents' memory or written on some piece of paper. So the information on the care of the illness compared to the clinical situation and urgent care situation can be detective work ...

To make analytical sense of the situation, we need to look at the recent *history* of the activity systems involved. Since the late 1980s, in municipal primary care health centers, the personal doctor principle and multi-professional teams have effectively increased the continuity of care, replacing the isolated *visit* with the long-term *care relationship* as the object of the practitioners' work activity. The notion of care relationship has gradually become the key conceptual tool for planning and recording work in health centers.

A parallel development has taken place in Finnish hospitals. Hospitals grew bigger and more complicated in the postwar decades. Fragmentation by specialties led to complaints and was seen to be partially responsible for the rapidly rising costs of hospital care. In the late 1980s, hospitals began to design and implement *critical paths* or *pathways* for designated diseases or diagnostic groups. At the beginning of the Boundary Crossing Laboratory work, the head physician of Children's Hospital made it clear to the participants that he saw critical pathways as the solution to the problems.

Excerpt 4 (Boundary Crossing Laboratory, Session I)

Head physician of Children's Hospital: Why critical pathways, that has surely been explained sufficiently, and now I'll only tell you that in the spring we started this activity. That is, the planning of critical pathways for children and adolescents in Uusimaa county. And we have a basic working group which has representatives from both the health center level and the central hospital level and from here and from all parties, that is, representatives of both nursing and physicians.

With these reforms spreading and taking root, shouldn't the problems with coordination and collaboration be under control? Evidence presented and discussed in Boundary Crossing Laboratory sessions led to the conclusion that this is not the case. Care relationships and critical paths were solutions created in response to particular historical sets of contradictions. These contradictions are rapidly being superseded by a new, more encompassing configuration of contradictions.

Care relationships and critical paths respond to contradictions *internal* to the respective institutions. Care relationships are seen as a way to conceptualize, document and plan long-term interactions with a patient inside primary health care.

Their virtue is that the patient can be seen as having multiple interacting problems and diagnoses that evolve over time; their limitation is that responsibility for the patient is practically suspended when the patient enters a hospital. Correspondingly, critical paths are constructed to give a normative sequence of procedures for dealing with a given disease or diagnosis. They do not help in dealing with patients with unclear and multiple diagnoses, and they tend to impose their disease-centered world view even on primary care practitioners. Fundamentally, both care relationships and critical paths are *linear* and *temporal* constructions of the object. They have great difficulties in representing and guiding *horizontal* and *socio-spatial* relations and interactions between care providers located in different institutions, including the patient and his/her family as the most important actors in care.

Asthmatic and allergic children with repeated respiratory problems are a clear case in point. Such a child may have more than a dozen hospital visits, including some stays of a few days in a ward, and even more numerous visits to primary care health center in one year. Some of these visits are serious emergencies, some of them are milder but urgent infections, some are for tests, control and follow-ups.

One of the cases we presented in the Boundary Crossing Laboratory was Simon, age 3. In 1997, he had three visits to the district hospital of his municipality, 11 visits to the HUCH ear clinic, 14 visits to his personal physician at the local health center, and one visit the outpatient clinic of the HUCH children's hospital. Another case we presented, Andrew, age 4, had in 1997 four visits to the HUCH hospital for skin and allergic diseases, nine visits to his local district hospital, and 14 visits to his primary care health center.

After we presented yet another such case in the Boundary Crossing Laboratory, the head physician of the Children's Hospital turned to the hospital physician who was in charge of designing the critical pathway for allergic children and asked her to explain how the implementation of the critical pathway will solve this child's problem. The response was something of a turning point for the head physician.

Excerpt 5 (Boundary Crossing Laboratory, Session 7)

Hospital physician: Here is first of all ... the care for asthma and then there is the care for food allergy. So in the case of one child, this cannot really be presented on one overhead, how this goes ...

Head physician (in aggravated tone): But isn't it quite common that children with allergies have these other problems? So surely they, surely you will plan some sort of a process which guarantees that these children do not belong to many critical pathways but ...?

Hospital physician: Well, unfortunately these children will indeed belong to multiple critical pathways ...

The constellation of contradictions in this field of activity systems is schematically depicted in Figure 6. In both the hospital and the health center, a contradiction emerges between the increasingly important *object* of patients moving between primary care and hospital care and the *rule* of cost-efficiency implemented in both

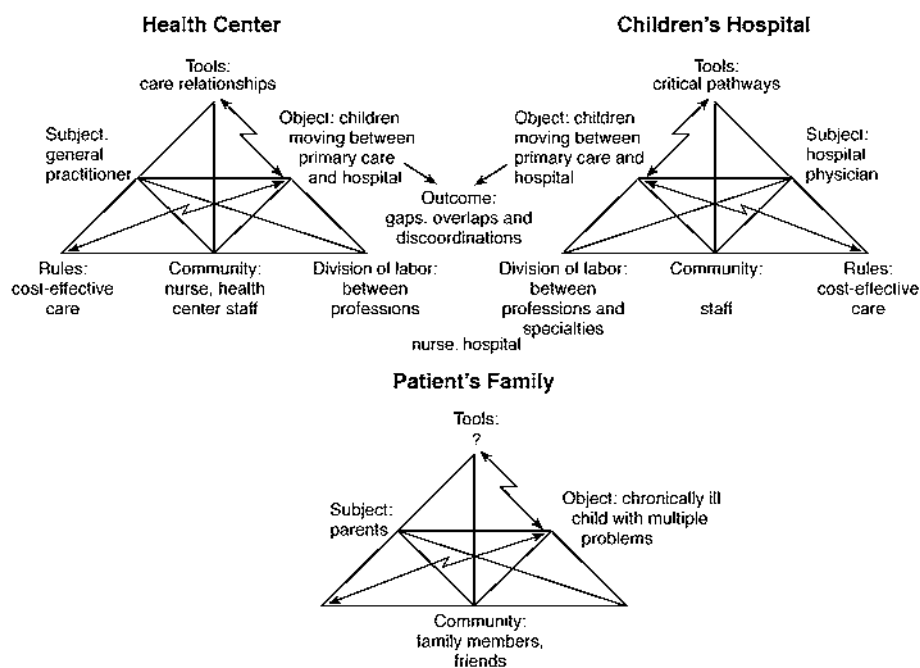


FIG. 6. Contradictions in children's health care in the Helsinki area.

activity systems. In Helsinki, the per capita expenditure on health care is clearly above national averages, largely due to the excessive use and high cost of services provided by the central university hospital of which the Children's Hospital is a part. Thus, there is an aggravated tension between the primary care health center and the university hospital. Health centers in the Helsinki area are blaming the university hospital for high costs, while the university hospital criticizes health centers for excessive referrals and for not being able to take care of patients who do not necessarily need hospital care.

A contradiction also emerges between the new *object* (patients moving between primary care and hospital care) and the recently established *tools*, namely care relationships in primary care and critical paths in hospital work. Being linear-temporal and mainly focused on care inside the institution, these tools are inadequate for dealing with patients who have multiple simultaneous problems and parallel contacts to different institutions of care. In the activity system of the patient's family, the contradiction is also between the complex object of multiple illnesses and the largely unavailable or unknown tools for mastering the object.

As different aspects of these contradictions were articulated in the Boundary Crossing Laboratory, we observed a shift among the participants from initial defensive postures toward a growing determination to do something about the situation. The determination was initially fuzzy, as if a need state (Bratus & Lishin, 1983) looking for an identifiable object and corresponding concept at which the energy could be directed.

	Activity system as unit of analysis	Multi- voicedness	Historicity	Contradictions	Expansive cycles
Who are learning?	Interconnected activity systems hospital, health center, patient's family	Voices of specialized hospital care, general primary care and lay home care			
Why do they learn?			Historically emerging pressures: patients move between primary care and hospitals	Contradictions between new object and available tools and rules in the three activity systems	
What do they learn?					
How do they learn?					

FIG. 7. Answers to the second question.

Excerpt 6 (Boundary Crossing Laboratory, Session 5)

Hospital physician: I kind of woke up when I was writing the minutes (of the preceding session) ... What dawned on me concerning B (name of the patient in the case discussed) is, I mean, a central thing ... for the mastery of the entire care. How will it be realized and what systems does it require? I think it was pretty good, when I went back through our discussion, I think one finds clear attempts at solving this. It is sort of a foundation, which we must erect for every patient.

Researcher: That seems to be a proposal for formulating the problem. What is ... or how do we want to solve it in B's case? I mean, is it your idea that what we want to solve is the mastery of the entire care?

Hospital physician: I think it's just that. I mean that we should have ... or specifically concerning these responsibilities and sharing of responsibility and of practical plans, and tying knots, well, we should have some kind of arrangement in place. Something that make everyone aware of his or her place around this sick child and the family.

We may now summarize the answers of the theory of expansive learning to the second question of the matrix (Figure 7).

What are They Learning?

In excerpt 6, a physician from the Children's Hospital used the expression 'tying of knots'. He referred to a preceding discussion in the same Boundary Crossing Laboratory session in which the researcher suggested the term 'knotworking' to capture the idea of the new pattern of activity needed to achieve collaborative care of children with multiple illnesses across institutional boundaries. The practitioners should be able to connect and coordinate with one another and with the parents quickly 'on the spot' when needed, but also on the basis of a shared and mutually monitored long-term plan. The notion of knotworking served as one link in an emerging configuration of concepts that was to define the expanded pattern of activity. In session 4, a task force of four practitioners, led by a hospital head nurse, presented their proposal for the improvement of feedback between the Children's Hospital and the health centers.

Excerpt 7 (Boundary Crossing Laboratory, Session 4)

Hospital head nurse: Well, this is the title—proposal for a trial period for the month of January, and a trial must always be evaluated, whether it succeeds or not, and what needs to be improved. And I say already at this point that this trial requires additional work, it brings more work. For the outpatient clinic, we propose a procedure in which the outpatient clinic during the entire month sends written feedback on every patient visit regardless of the continuation. To whom, to the home, to the personal primary care physician, to the physician who wrote the referral ...

The proposal met with a range of objections, largely centering on the excessive amount of work the feedback system was expected to cause. The head physician of Children's Hospital joined in the chorus of objections, employing the available concept of critical pathways as a warrant in his argument.

Excerpt 8 (Boundary Crossing Laboratory, Session 4)

Hospital head physician: We have these task force groups for the critical pathways in place, and they have also discussed this matter, and without exception they have the opinion that definitely not for every visit—I, too, would be afraid that if there is feedback for every visit, there will be so many pieces of paper that the essential information gets easily lost, so surely it would be better that the sender, that is those who are in charge of the care of the patient, should themselves assess when feedback needs to be sent.

The proposal was rejected. In the fifth session of the Boundary Crossing Laboratory,

the task force came back with a new proposal. In the discussion, the new proposal was mainly referred to as 'care responsibility negotiation'. The term 'care agreement' was also mentioned. The proposal emphasized communication and negotiation between the parents and the different practitioners involved in a child's care.

This proposal had a favorable response. It was elaborated further in the sixth session. In this session, the 'care agreement' emerged as the central new concept. The older concept of critical pathways was still used side by side with the new idea of care agreement.

Excerpt 9 (Boundary Crossing Laboratory, Session 6)

Hospital head nurse: Then an important thing in this is the division of care responsibility which we have discussed, which is difficult to chew on. Now this also takes a stand with regard to the division of care responsibility, and at the end there is the important point that parents have accepted the plan and the concept of feedback refers simply to a copy of the medical record text which contains necessary contact information. And in our opinion this would mean additional work but this would be simple enough, flexible and possible to realize if we embark on this, and the goal is to develop dialogue ...

Data security specialist: Well, if I may comment on this. This would in my opinion be exactly building the critical pathway model, finding ways to improve the critical pathway and the work within it.

Hospital physician 1: An agreement is made only if the hospital care exceeds two visits or goes beyond a standard protocol, so in fact we imagine that the majority of visits will fall into those not exceeding two visits or the protocol.

Hospital physician 2: ... what may be new in this is that in the second visit, or the visit when the outpatient clinic physician makes the care agreement proposal, which is a kind of a vision for continuation of care, so he or she kind of presents this vision also to the parents sitting there, who become committed this way to this continuation of care and to the distribution of care responsibility, however the distribution is defined, something that probably has not been talked about so clearly to the parents. That's what makes this excellent.

Information systems specialist: ... In my opinion, this is a great system, and as an outsider I say, implement this as soon as possible so that after a sufficient trial period we can duplicate this system elsewhere. This is a great system.

Under the umbrella on care agreement, four interconnected solutions were created. First, the patient's personal physician—a general practitioner in the local health center—is designated as the *coordinator* in charge of the patient's network and

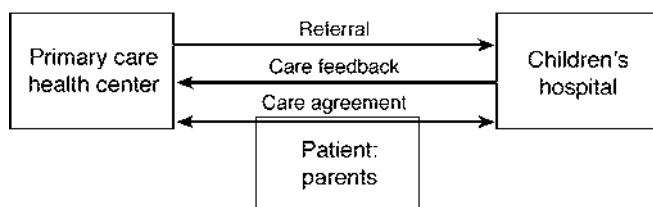


FIG. 8. Conceptual model of the care agreement practice.

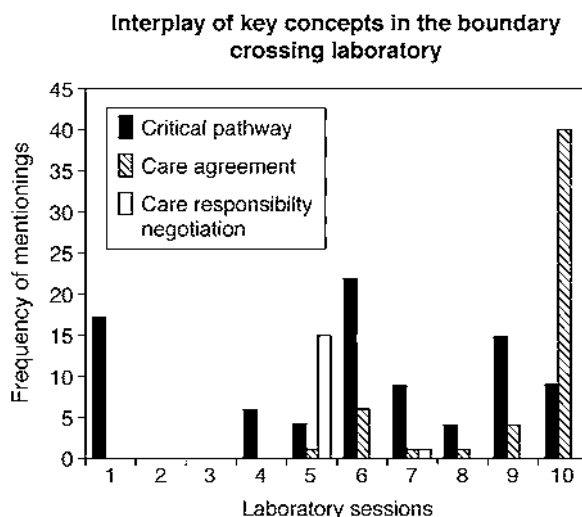


FIG. 9. Frequency of mentionings of three key concepts in the sessions of the Boundary Crossing Laboratory.

trajectory of care across institutional boundaries. Secondly, whenever a child becomes a patient of the children's hospital for more than a single visit, the hospital physician and nurse in charge of the child draft a *care agreement* which includes a plan for the patient's care and the division of labor between the different care providers contributing to the care of the child. The draft agreement is given to the child's family and sent to the child's personal health center physician (and when appropriate, to the physicians in charge of the child in other hospitals) for their scrutiny. Thirdly, if one or more of the parties find it necessary, they will have a *care negotiation* (by e-mail, by telephone, or face to face) to formulate a mutually acceptable care agreement. Fourthly, *care feedback*, in the form of a copy of the patient's medical record, is automatically and without delay given or sent to the other parties of the care agreement after the patient's unplanned visit or changes in diagnoses or care plans. Figure 8 depicts a simplified model of the care agreement, produced and used by the practitioners in the Boundary Crossing Laboratory.

The care agreement practice aims at resolving the contradictions depicted in Figure 6 by creating a new instrumentality. This instrumentality, when shared by parents and practitioners across institutional boundaries, is supposed to expand the object of

their work by opening up the dimension of horizontal, socio-spatial interactions in the patient's evolving network of care, making the parties conceptually aware of and practically responsible for the coordination of multiple parallel medical needs and services in the patient's life. This does not replace but complements and extends the linear and temporal dimension of care. The solution also aims at relieving the pressure coming from the rule of cost-efficiency and the tension between the children's hospital and health centers by eliminating uncoordinated excessive visits and tests and by getting the health center general practitioners involved in making joint care decisions that are acceptable to all parties.

The new instrumentality is supposed to become a germ cell for a new kind of collaborative care, 'knotworking,' in which no single party has a permanent dominating position and in which no party can evade taking responsibility over the entire care trajectory. The model implies a radical expansion of the object of activity for all parties: from singular illness episodes or care visits to a long-term trajectory (temporal expansion), and from relationships between the patient and a singular practitioner to the joint monitoring of the entire network of care involved with the patient (socio-spatial expansion).

The stepwise emergence of the concept of care agreement in this learning process is captured in Figure 9. The figure depicts the frequency of mentionings of three key concepts—*critical pathway*, *care responsibility negotiation*, and *care agreement*—in the ten sessions of the Boundary Crossing Laboratory.

Figure 9 tells us that at the beginning of the sessions, the officially adopted concept of critical pathways dominated. In the second and third sessions, the patient cases effectively eliminated the use of such official terminology. As I pointed out above, in session 4 a proposal was presented to test a new feedback procedure. This proposal did not have a conceptual shape and name. It was seen as an attempt to mechanically increase paperwork, and it was rejected. In session 5, a new communication- and collaboration-oriented proposal was presented, first referred to as care responsibility negotiation. In session 6, the new proposal was worked out in more detail, now firmly under the title of care agreement.

Still, the new model was discussed in parallel with the older concept of critical pathways. In session 7 (see excerpt 5), these two concepts actually clashed. In sessions 8 and 9, the new concept gained currency, until it was fully accepted in session 10. Still, even in that last session, the notion of critical pathways was taken up again as a contender to the idea of care agreement. The tension-laden coexistence and struggle between the two is far from over.

We may now summarize the answers of the theory of expansive learning to the third question of the matrix (Figure 10).

How do They Learn—What are the Key Actions?

Theories of organizational learning are typically weak in spelling out the specific processes or actions that make the learning process. One of the more interesting attempts to open up this issue is Nonaka and Takeuchi's (1995) framework of cyclic knowledge creation, based on conversions between tacit and explicit knowledge.

	Activity system as unit of analysis	Multi- voicedness	Historicity	Contradictions	Expansive cycles
Who are learning?	Interconnected activity systems hospital, health center, patient's family	Voices of specialized hospital care, general primary care and lay home care			
Why do they learn?			Historically emerging pressures: patients move between primary care and hospitals	Contradictions between new object and available tools and rules in the three activity systems	
What do they learn?	A new pattern of activity: knotworking based on the instrumentality of care agreement		Historical layering and co-existence of old and new concepts: pathways and care agreement	Struggle between old and new concepts: critical pathway vs care agreement	Expansion of the object from visit to trajectory: from doctor-patient dyad to network of care
How do they learn?					

FIG. 10. Answers to the third question.

Their model posits four basic moves in knowledge creation: socialization, externalization, combination, and internalization.

A central problem with Nonaka and Takeuchi's model, and with many other models of organizational learning, is the assumption that the assignment for knowledge creation is unproblematically given from above. In other words, what is to be created and learned is depicted as a management decision that is outside the bounds of the local process (see Engeström, 1999b). This assumption leads to a model in which the first step consists of smooth, conflict-free socializing, the creation of 'sympathized knowledge' as Nonaka and Takeuchi (1995) call it.

In contrast, a crucial triggering action in the expansive learning process discussed in this paper, as in other analogous processes we have analyzed, is the conflictual *questioning* of the existing standard practice. In the Boundary Crossing Laboratory, this questioning was invoked by the troublesome patient cases, to be defensively rejected time and again. The practitioners did also begin to produce questioning actions in their own voices, a small example being excerpt 2: '... And here I think we now have a pretty obvious issue, we just have to ask whether the patient record is actually sent to the primary care.' This led to deepening *analyses* of the cases, and eventually to sharper and more articulated questioning, exemplified in excerpt 3: 'A chronically ill child who has several illnesses does not necessarily have a clearly defined physician in charge. The care is fragmented. The information is terribly fragmented ...'.

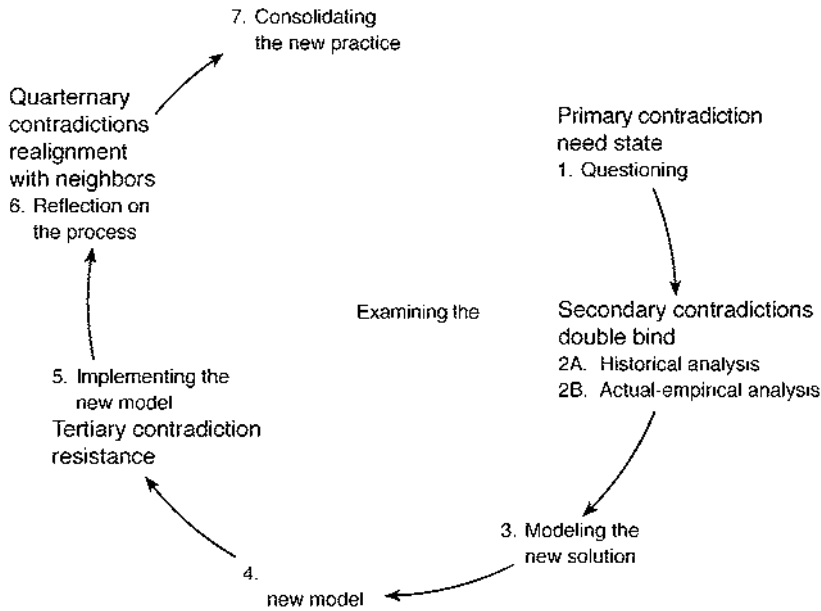


FIG. 11. Strategic learning actions and corresponding contradictions in the cycle of expansive learning.

The analysis of contradictions culminated much later as the conflict between critical pathways (available tool) and patients with multiple illnesses (new object) was articulated in excerpt 5: ‘But isn’t it quite common that children with allergies have these other problems? So surely they, surely you will plan some sort of a process which guarantees that these children do not belong to many critical pathways but ...?’.

Actions of questioning and analysis are aimed at finding and defining problems and contradictions behind them. If the management tries to give a fixed learning assignment from above in this type of process, it is typically rejected (Engeström, 1999b). Out of these debates, a new direction begins to emerge, as seen in excerpt 6: ‘... What dawned on me concerning B (name of the patient in the case discussed) is, I mean, a central thing ... for the mastery of the entire care. How will it be realized and what systems does it require?’.

The third strategic action in expansive learning is *modeling*. Modeling is already involved in the formulation of the framework and results of the analysis of contradictions, and it reaches its fruition in the modeling of the new solution, the new instrumentality, the new pattern of activity. In the Boundary Crossing Laboratory, the first proposal of the project group in session 4 was the first attempt at such modeling (see excerpt 7). The critical discussion and rejection of this proposal (excerpt 8) is an example of the action of *examining the new model*. The second, successful proposal, presented in session 5, is again an example of modeling, and the ensuing elaboration is session 6 (excerpt 9) again represents examining the new model.

	Activity system as unit of analysis	Multi- voicedness	Historicity	Contradictions	Expansive cycles
Who are learning?	Interconnected activity systems hospital, health center, patient's family	Voices of specialized hospital care, general primary care and lay home care			
Why do they learn?			Historically emerging pressures: patients move between primary care and hospitals	Contradictions between new object and available tools and rules in the three activity systems	
What do they learn?	A new pattern of activity: knotworking based on the instrumentality of care agreement		Historical layering and co-existence of old and new concepts: pathways and care agreement	Struggle between old and new concepts: critical pathway vs care agreement	Expansion of the object from visit to trajectory: from doctor-patient dyad to network of care
How do they learn?		Dialogue and debate between positions and voices, focused on a vital object		Contradictions converted from need state to double bind to resistance to realignment	Learning actions from questioning to analysis, modeling, examining, implementing, reflecting ...

FIG. 12. Answers to the fourth question.

The care agreement model has been implemented in practice since May 1998. The manifold *implementation actions* open up a whole different story of tensions and disturbances between the old and the new practice, a story too large and complex to be entered in this paper (see Engeström *et al.*, 1999; Engeström, in press). The cycle of expansion (Figure 11) is not completed yet. Our research group continues to follow and document the implementation and to feed back intermediate findings to the practitioners.

We may now summarize the answers of the theory of expansive learning to the fourth question—and to all four questions—of the matrix (Figure 12).

Conclusion: directionality in learning and development

We habitually tend to depict learning and development as vertical processes, aimed at elevating humans upward, to higher levels of competence. Rather than simply denounce this view as an outdated relic of enlightenment, I suggest that we construct a complementary perspective, namely that of horizontal or sideways learning and development. The case discussed in this paper provides rich indications of such a complementary dimension.

In particular, the construction of the concept of care agreement (with the related concepts of care responsibility negotiation and knotworking) by the participants of the Boundary Crossing Laboratory is a useful example of developmentally significant sideways learning. In his classic work on concept formation, Vygotsky

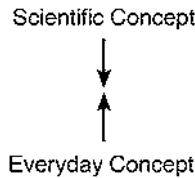


FIG. 13. The basic Vygotskian view of concept formation.

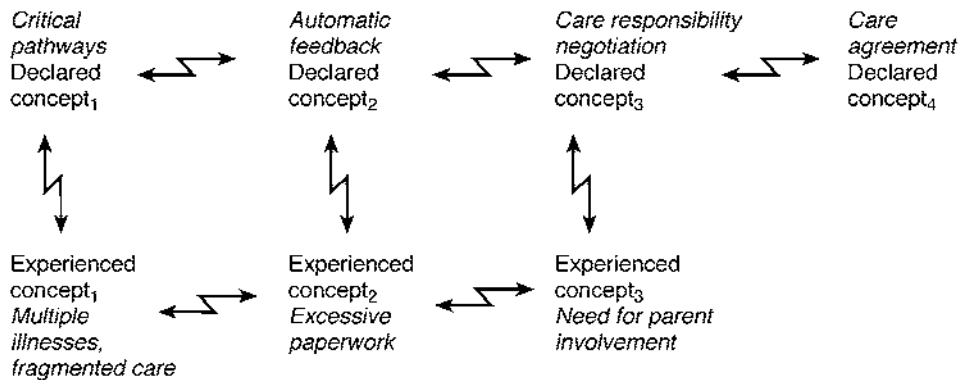


FIG. 14. Expanded view of directionalities in concept formulation.

(1987) basically presented the process as a creative meeting between everyday concepts growing upward and scientific concepts growing downward. While this view opened up a tremendously fertile field of inquiry into the interplay between different types of concepts in learning, it did retain and reproduce the basic singular directionality of vertical movement (Figure 13). Later works by such western scholars as Nelson (1985, 1995) and also by the greatest Russian analyst of learning, V. V. Davydov (1990), enriched and expanded Vygotsky's ideas, but the issue of directionality remained intact.

How does this image correspond to the data on expansive learning in the Boundary Crossing Laboratory? Concept formation in the laboratory sessions started out with the 'scientific concept' proposed by the management: *critical pathways*. Instead of identifiable everyday concepts, it was met and confronted by our videotaped cases and live parents, telling about children with *multiple illnesses and fragmented care*. The meeting was uneasy, if not outright conflictual.

What followed was a sideways move. Instead of trying to merge the possibly incompatible worlds of the 'scientific concept' of critical pathways and the everyday experience of the patients, a group of practitioners presented a series of alternative conceptualizations. This sideways move started with the poorly articulated idea of *automatic feedback* on every patient visit from the hospital to the primary care health center. This attempt at formulating a new deliberate concept was rejected 'from below', using the experiential threat of *excessive paperwork* as the main conceptual argument.

The proponents of the new idea did not give up. They initiated another sideways

move and proposed a new concept: *care responsibility negotiation*. This was met more favorably. The practitioners used their experiences of the need for *parent involvement* (see excerpt 9) to elaborate, refine and concretize the concept. This led to yet another sideways move: the formulation of the concept of care agreement. Since the spring of 1998, through their actions of implementing this concept in practice, practitioners and parents have accumulated experiences to challenge and transform this concept again in new sideways moves.

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