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ORIGINAL PAPER

# Expansive Learning in a Library: Actions, Cycles and Deviations from Instructional Intentions

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**Abstract** The theory of expansive learning has been applied in a large number of studies on workplace learning and organizational change. However, detailed comprehensive analyses of entire developmental interventions based on the theory of expansive learning do not exist. Such a study is needed to examine the empirical usability and methodological rigor afforded by the theory of expansive learning. In this paper, we present a comprehensive analysis of learning in a entire Change Laboratory intervention in which the workers of an academic library, together with their clients, redefined the services the library offers to research groups and the ways of organizing work in the library. We identified expansive learning and non-expansive actions in the transcripts of the intervention sessions. We examined cyclicity of expansive learning at three levels, namely the level of the entire Change Laboratory process, the level of each Change Laboratory session, and the level of cross-session object-bound cycles. Finally we analyzed deviations between the instructional intentions of the interventionists and the actually accomplished learning process. The analysis shows that in a real-life formative intervention expansive learning actions emerged in the midst of a fairly large number and diversity of non-expansive learning actions. Our analysis of cyclicity revealed an iterative loop within the overall cycle of the Change Laboratory. Our analysis of deviations from instructional intentions and plans demonstrates that expansive learning is indeed more than mere replication or imposition of the interventionists' plans. The very process is punctuated by deviations which open up space for learner agency and creation of truly new solutions and concepts.

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## Introduction

In discussions of work-related learning, a search is going on for viable, culturally grounded theories that could bridge and transcend the gaps between formal and informal, individual and collective, acquisitional and participatory, transmission and transformation views of learning (e.g., Fenwick 2006; Hodkinson et al. 2007; Malloch et al. 2011). Proposing and promoting theories is, however, not anymore sufficient. It is increasingly important to examine and test the empirical usability and methodological rigor afforded by the theory. This will also pave way for the much needed cross-fertilization between theories Sawchuck (2011, p. 177) calls for.

For studies of workplace learning, the tradition of cultural-historical activity theory (Leont'ev 1978; Engeström, Miettinen and Punamäki 1999; Sannino et al. 2009) is an important reservoir, still poorly known and understood in most parts of the world (Roth and Lee 2007). Within cultural-historical activity theory, several influential theories of learning have emerged.[1] The most recent one of these, the theory of expansive learning, is aimed at explaining and guiding collective transformation efforts in organizations and workplaces. Since its inception (Engeström 1987), it has been applied and further developed in a large number of studies on workplace learning and organizational change (Engeström and Sannino 2010). In this paper, we examine the empirical usability and methodological rigor afforded by the theory of expansive learning.

The theory of expansive learning is the backbone of a formative intervention toolkit called the Change Laboratory (Engeström et al. 1996; Engeström 2007; 2011). Variations of this toolkit have been used in numerous intervention studies in settings ranging from post offices and factories to schools, hospitals and newsrooms. The Change Laboratory serves as a microcosm in which potential new ways of working can be envisioned, designed, experienced and experimented with (Engeström 1987, p. 277–278). A Change Laboratory is typically conducted in an activity system that is facing a major transformation. This is often a relatively independent pilot unit in a large organization. Working practitioners and managers of the unit, together with a small group of interventionist-researchers, conduct five to ten successive Change Laboratory sessions, often with follow-up sessions after some months. When feasible, also clients, customers or patients are invited to join Change Laboratory sessions in which their particular cases are analyzed in detail. Change Laboratories are also conducted as boundary crossing laboratories with representatives from two or more activity systems engaged in collaboration or partnership.

From the point of view of the present paper, three central claims of the theory of expansive learning are of particular interest. *First,* the theory proposes that an expansive learning process consists of expansive learning actions. Seven expansive

[1] The most widely known learning theories in the cultural-historical tradition are Gal'perin's (1969) theory of stagewise formation of mental actions, Davydov's (1990; 2008) theory of learning activity, and Engeström's (1987) theory of expansive learning.

learning actions are identified by the theory (see the next section). Sequences of expansive learning actions have been analyzed in detail in work team meetings of limited duration and with no planned intervention involved (Engeström 2008, pp. 118–168). To our knowledge no published studies exist in which an entire Change Laboratory intervention would be analyzed comprehensively, covering all speaking turns and topical episodes in the series of intervention sessions.

This prompts us to formulate our first research question, with three more specific sub-questions:

Question 1: To what extent can the entire process of a Change Laboratory intervention be described and analyzed with the help of the seven expansive learning actions posited by the theory of expansive learning?

1.1. Which expansive learning actions may be identified in a Change Laboratory process and what are the frequencies of appearance of these learning actions in the process?
1.2. What non-expansive learning actions may be identified in the process and what is their quantitative role in relation to expansive learning actions?
1.3. What sub-types of expansive learning actions may be identified within the seven learning actions and how frequent are these sub-types?

*Secondly,* the theory of expansive learning proposes that full-fledged sequences of expansive learning actions typically take the shape of relatively predictable cycles. While an ideal-typical cyclic sequence of the actions is proposed, the theory argues that in reality the actions appear in different but not fully arbitrary combinations and iterations. Furthermore, there are smaller cycles within larger-scale expansive cycles. Thus, within an entire Change Laboratory intervention one should be able to identify multiple smaller, potentially expansive cycles of learning actions. Although expansive cycles have been examined in several studies (e.g., Foot 2001; Mukute 2010; Pihlaja 2005), we know of no published studies which would systematically identify and analyze miniature cycles within the overall cycle of expansive learning in a Change Laboratory intervention.

This prompts us to formulate our second research question, with two more specific sub-questions:

Question 2: To what extent can the entire process of a Change Laboratory intervention be described and analyzed in terms of expansive cycles of learning actions?

2.1. What are the characteristics of possible cyclicity of the expansive learning actions at the level of the overall process of the Change Laboratory?
2.2. What kinds of smaller-scale cyclicity may be found within the overall process?

*Thirdly,* the theory of expansive learning maintains that the interventionist's intentions, plans and instructional actions do not mechanically determine the course of the participants' learning actions. "The studies show that the learning actions taken by participants do not necessarily correspond to the intentions behind the tasks assigned by the interventionist. Time and again, the participants take over the leading role in the intervention process, rejecting and reformulating tasks and performing

actions that change the plans of the interventionist." (Engeström and Sannino 2010, p. 12) This gap between instructional intentions and actually performed learning actions is an important potential source of agency and innovation (Engeström and Sannino 2012). Yet, this gap has not been systematically analyzed in empirical studies.

This prompts us to formulate our third research question:

Question 3: What kinds of deviations may be found between the interventionists' instructional intentions and the actual learning actions taken by the participants in a Change Laboratory?

We will examine and answer the research questions by means of analyzing a Change Laboratory process conducted by our research team in the Center Campus Library of University of Helsinki. In the fall of 2010, we conducted and videotaped eight Change Laboratory sessions with the library staff, their management, and representatives of four pilot clients, namely four university research groups in social sciences and humanities.[2]

In the next section, we will elaborate on the central theoretical ideas and concepts that guide our study. We will then describe the organizational setting and the Change Laboratory intervention analyzed in this paper. After that, we will present our data and methods. Then, we will analyze our data in three sections, each devoted to one of our three main research questions. At the end, we will discuss our findings and conclude with remarks on the relevance and need for further studies on expansive learning in various workplaces.

## Expansive Learning as Research Challenge

The notion of learning action stems directly from Leont'ev's (1978) classic distinction between activity, action, and operation. Activity is the molar unit of human conduct, a relatively durable collective and systemic formation directed toward an object and motive which are usually difficult to articulate for individual participants. Activity is realized by means of actions. These are shorter-term modular units aimed at goals which can usually be articulated by the acting subject, at least retrospectively. An action can be taken by an individual or it may be collaborative, accomplished by a group (Rubtsov 1991). Actions are carried out with the help of smaller components, namely automatic operations which are dependent on the instruments and circumstances available; the actor is normally not aware of the operations he or she is using in a given action.

Learning activity is a particular historical form of learning, the content of which is the creative appropriation of theoretical knowledge and concepts (Davydov 2008). Theoretical refers here to a mode of knowing which reproduces the genesis, development and movement of systemic objects by the method of ascending from the abstract to the concrete (Davydov 1990). In ascending from the abstract to the concrete, the learner facing a chaotic sensory concrete situation analyzes the situation by transforming and experimenting with it until he or she identifies and models an

[2] There are a few studies of libraries in which cultural-historical activity theory has been used as a conceptual framework (e.g., Meyers 2007; Spasser 2002). As a Change Laboratory intervention is built on the local history and concrete circumstances of the given work setting, these previous studies serve primarily as useful introductions to the field of library work.

initial "germ cell" abstraction, a simple relationship that explains the complex whole under scrutiny. This initial abstraction is examined, then used and expanded to construct a range of concrete applications and tasks understandable and solvable by means of the "germ cell". Theoretical knowledge understood in this dialectical sense is not the opposite of practice; it springs from practical experimentation and culminates in the shaping and creation of new forms of practice.

Learning activity – or expansive learning – is the entire process of ascending from the abstract to the concrete. Learning activity is mastery of expansion from actions to new activity. It is "an *activity-producing activity"* (Engeström 1987, p. 125, italics in the original). Expansive learning actions are steps necessary for the accomplishment of learning activity. The theory of expansive learning proposes the following seven actions.

- The first action is that of questioning, criticizing or rejecting some aspects of the accepted practice and existing wisdom. For the sake of simplicity, we call this action *questioning.*
- The second action is that of *analyzing* the situation. Analysis involves mental, discursive or practical transformation of the situation in order to find out causes or explanatory mechanisms. Analysis evokes "why?" questions and explanatory principles. One type of analysis is *historical-genetic;* it seeks to explain the situation by tracing its origins and evolution. Another type of analysis is *actual-empirical;* it seeks to explain the situation by constructing a picture of its inner systemic relations.
- The third action is that of *modeling* the newly found explanatory relationship in some publicly observable and transmittable medium. This means constructing an explicit, simplified model of the new idea that explains and offers a solution to the problematic situation.
- The fourth action is that of *examining the model,* running, operating and experimenting on it in order to fully grasp its dynamics, potentials, and limitations.
- The fifth action is that of *implementing the model* by means of practical applications, enrichments, and conceptual extensions.
- The sixth action is that of *reflecting on and evaluating* the process of expansive learning.
- The seventh action is that of *consolidating and generalizing* the outcomes into a new stable form of practice.

Bounding an expansive learning action in empirical data is no simple matter. In a Change Laboratory setting, learning is a highly collaborative and discursive endeavor in which hierarchical and competitive relations between the participants are bracketed as much as possible. Learning actions in such a setting are primarily identified through talk, accompanied by gesture, posture, gaze, and use of physical artifacts, including textual and graphic representations. Learning actions typically involve some sort of exchange – often a lengthy one - between interlocutors, although even a singular speaker's utterance with no ostensible response from others may be regarded as a learning action in specific cases. For a learning action to take place, a *task* of some kind must be adopted by the participants. The task may be explicitly formulated at the beginning or during the course of the action, or it may be approached in a more tacit and piecemeal fashion.

The theory of expansive learning maintains that expansive processes are not pure, that is, they contain not only expansive but also non-expansive learning actions. In the

study of team meetings mentioned above, two such non-expansive actions were identified, namely formulating/debating a problem and reinforcing existing practice. The first one of these is characterized as "presentation and discussion of the issue prepared *for* the team, not initiated and constructed *by* the team" (Engeström 2008, p. 133, italics in the original). In a full-scale Change Laboratory process, we are likely to find numerous different non-expansive actions. If they are very frequent, we need criteria for determining when one may still see the overall process as expansive. These criteria are bound with the transformation of the object of the activity under scrutiny. The object is expected to expand both socio-spatially and temporally, to embrace a wider network of actors and a longer time perspective (Engeström et al. 2003).

It is also likely that the proposed expansive learning actions are internally heterogeneous. In fact the theory already names two sub-types of the action of analysis, namely historical-genetic analysis and actual-empirical analysis. The identification of sub-types within the expansive learning actions may significantly increase the empirical usability of the theory.

The notion of expansive learning cycles is based on the idea of ascending from the abstract to the concrete. The theory of expansive learning enriches Davydov's (1990) view of ascending from the abstract to the concrete by incorporating into it the stepwise development of contradictions. In actions of questioning, primary contradictions appear as increasingly troubling but diffuse tensions and disturbances in the activity system. In actions of analysis, manifest and aggravated secondary contradictions are identified between two or more components in an activity system (e.g., between a new object and old instruments). In actions of implementing, tertiary contradictions appear between a new model of activity and remnants of the previous mode of activity. In actions of consolidating and generalizing, quaternary contradictions emerge between the newly reorganized activity and its neighboring activity systems. As the actions of consolidating and generalizing accomplish a relative resolution of the contradictions and thus a stabilization, albeit a temporary one, they are seen as signaling the end of a cycle (and the beginning of the next one).

The theory of expansive learning emphasizes that the ideal-typical sequence of actions in a cycle is not to be found in pure form in practice; there are odd combinations, breaks, digressions and iterative loops. If this is the case, when are we entitled to speak of the appearance of a cycle? A partial answer may be gleaned from Mukute's (2010) study of Change Laboratories in African sustainable farming communities. He showed that even though the learning actions did not follow a clean orderly sequence, their overall shape did resemble the original cycle in that "all the crucial elements of expansive learning could be identified and their overall shape is not so chaotic after all" (Dochy et al. 2011, p. 144).

Dictionaries commonly define cyclicity as the quality of recurring at regular intervals (see also Gould 1987). The recurring quality of expansive cycles is empirically accessible by means of analyzing smaller cycles within a bigger cycle. However, when we analyze relatively compact Change Laboratory processes, and especially if we examine possible mini-cycles within the overall cycle, can we really expect that also the last actions of the ideal-typical cycle (implementing, reflecting, consolidating) appear regularly? Or is the Change Laboratory process – especially if the follow-up sessions are not included – more like push to move through the first four actions of the cycle? The present study aims at shedding light on these issues. By doing this, we also aim at sharpening the empirical criteria for cyclicity in processes of expansive learning.

The Change Laboratory process is typically carefully planned in advance. Each session is aimed at fostering some specific expansive learning actions. There is a script which the interventionists strive to follow. Comparisons between the interventionists' script and the actual unfolding of events and actions in the sessions regularly reveal a gap between the instructional intentions and the actually realized learning actions.

Basically such a gap emerges in all instructed learning. In their studies of multi-ethnic school classrooms, Gutiérrez and her colleagues analyzed how this gap led to collisions between the teacher's authoritative script and the students' counter-script. Occasionally the parties found common ground on which they could build meaningful negotiated learning. Gutiérrez and her colleagues characterize these events as emergence of "third spaces" in the teaching-learning process (Gutiérrez et al. 1995; Gutiérrez et al. 1999; Gutiérrez 2008).

In Change Laboratories conducted with adult professionals, the interventionist's script is typically much less fixed and authoritative than the teacher's script in a school. Although deviations from the interventionist's instructional intentions have been noted in several studies (e.g., Engeström et al. 2002, p. 212; Toiviainen and Engeström 2009, p. 103), there are no published studies in which these deviations, and the associated contestations, negotiations, "third spaces", and novel objects, are analyzed systematically and comprehensively over entire Change Laboratory processes. Such an analysis will open up important resources for understanding the process of expansive learning as a process of formation of agency.

## The Setting and the Intervention

From 2009 to the end of 2011, our research group[3] and the University of Helsinki Library conducted a joint project aimed at creating a new model of library services for researchers and research groups. The project was called "Knotworking in the Library." The broader background of this project is the emerging crisis of university libraries worldwide. The nature of the crisis is aptly sketched by Greenstein (2010).

"University libraries are principally reliant for their operating revenues on the same funds that meet the costs of a university's academic departments (including, crucially, the faculties' salaries). Bluntly, those funds are diminished by the global recession, and it is not clear that they are likely to rebound, let alone resume their growth, any time soon. […]

Why invest much at all in the university library when journals, reference works, and soon tens of millions of books and monographs, both in and out of print, will be available effortlessly and online?" (Greenstein 2010, p. 121–122)

Greenstein, like many others, argues that academic libraries must radically reinvent themselves.

"Thus, 'subject librarians' on a leading edge of today's library services (undoubtedly travelling under a different name) do not simply assist users in navigating increasingly complex information resources. They also lend support to scholars in

[3] The PI of the research group was Yrjö Engeström. Other members were Heli Kaatrakoski, Anne Laitinen, Heli Myllys, and Juhana Rantavuori. Johanna Lahikainen from the library staff also participated in the research group and served as key liaison person.

other ways—using information technology in instruction, 'curating' digital materials that result from research and teaching, and navigating an increasingly vast array of scholarly publishing vehicles. Libraries may adopt broader institutional roles—managing an institution's information infrastructure (which can include publishing and broadcast services as well as IT) or taking a larger role in strategic communications, for example, by surfacing materials that result from research and teaching and making them accessible in a manner that supports institutional advocacy, revenue generation, or specific public service goals. (Greenstein 2010, p. 125)

However, such a radical redefinition of the university library is not easy: "Changes in the library's scope of operations are more difficult to predict than trends affecting historic information access functions and collection management." (Greenstein 2010, p. 125) In academic libraries two types of work exist simultaneously; craft-like work on collections and standardized mass production with customers. This means that academic libraries are focused on taking care of collections of physical books and journal as well as streamlining standardized services for the individual clients, particularly for the students. Academic libraries are not used for the collective and mutual co-creation and co-configuration of services with their clients. Furthermore, they are used to instruct their clients, not negotiate with them.

In 2009, the library of University of Helsinki asked our research group to conduct an intervention study that would help the library professionals and managers in their efforts to redefine the services, ways of working, and organization of the library. The university library is organized into four campus libraries and a central unit responsible for centralized electronic services and administration. The university library has approximately 250 employees and its annual budget is over 21 million Euro. About 2,5 million loans are handled annually. The university management has decided to develop the library without radical cuts in personnel.

The Helsinki University Library is undergoing a major transformation in at least three respects. First of all, the digitization of information and the emergence of powerful web-based tools of information storing and searching have led to a radical decrease in researchers' physical visits to library and also in their use of physical books and journals. Secondly, especially in the central campus of the university with social sciences and humanities collections, numerous small discipline- and department-based libraries are being physically and administratively merged into a large unified campus library. Thirdly, the university is constructing a new building for the central campus library. The concern is that the new library facilities will be actively used only by students while researchers and faculty will only use web-based digital services.

The working hypothesis of our project was that research groups do in fact need new kinds of library services to master large and complex sets of data as well as the demands of information search, electronic publishing, evaluation of one's own research, and visibility in the scientific community. Our preparatory analysis led us to assume that the present object of the library's work with researchers was an individual researcher's discrete request for publications or publication-related information. The needed new object would be a long-term partnership with a research group needing support in the management of data, publishing, and following the global flow of publications. This new object would require a new division of labor, new competences, and a new organization model for the library.

Not all services that would meet these emerging needs were yet there. They needed to be co-constructed and continuously reconfigured in flexible knotworking between

librarians and research groups (for the concept of knotworking, see Engeström, Engeström and Vähäaho 1999). To create groundwork for such knotworking in the form of a jointly constructed service palette for research groups as well as corresponding new work practices and organizational structures, we conducted a Change Laboratory first in the campus library of biosciences, then in the central campus. This paper focuses on the latter one.

The dates, contents and participants of the eight Change Laboratory sessions are summarized in Table 1. As the table shows, the first session was held with the library staff only, and the second session with both the library staff and all the four pilot research groups - Cognitive Science, Communication Law, Finnish Language, and Gender Studies. The third session was held with the library staff and the first two pilot research groups, and the fourth session with library staff and the two remaining pilot research groups. The participation pattern of sessions 3 and 4 was repeated in sessions 5 and 6. The final seventh and eighth sessions were held with the library staff only.

The Change Laboratory is built on ethnographic data from the activity setting in which it is conducted. In this case, we collected employee and client interviews on problems and needs related to the functioning of the library. Excerpts from these interviews were used in the sessions as "mirror material" or "first stimuli" (Engeström 2011) to trigger and support collaborative analysis.

At the beginning of the process, we asked the library staff to draft a graphic model of the services they would construct and offer for research groups. This service palette was depicted as a diagram of interconnected circles representing envisioned key service categories. This diagram in its various versions and modifications served as a central conceptual model, or "second stimulus" (Engeström 2011), throughout the process.

**Table 1** Summary of the Change Laboratory sessions and their participants (fall of 2010)

| | Date | Purpose of the session | L | R-CS | R-CL | R-FL | R-GS | I | T |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 10-05 | Preparing a proposal of services to be presented to research groups in the next session | 17 | – | – | – | – | 6 | 23 |
| 2 | 10–15 | Presentation of the service palette as a proposal to the four research groups | 16 | 1 | 2 | 4 | 1 | 6 | 30 |
| 3 | 10–22 | Adjusting the service palette to the specific needs of CS and CL research groups | 15 | 3 | 1 | – | – | 6 | 25 |
| 4 | 10–29 | Adjusting the service palette to the specific needs of FL and GS research groups | 13 | – | – | 4 | 2 | 6 | 25 |
| 5 | 11–05 | Refining services for implementation with CS and CL research groups | 15 | 2 | 1 | – | – | 6 | 24 |
| 6 | 11–10 | Refining services for implementation with FL and GS research groups | 13 | – | – | 4 | 3 | 6 | 26 |
| 7 | 11–19 | Requirements of the service model for the library organization | 17 | – | – | – | – | 6 | 23 |
| 8 | 11–26 | Implementation plan for the library organization | 16 | – | – | – | – | 6 | 23 |

*L* Library, *R-CS* Cognitive Science research group, *R-CL* Communication Law research group, *R-FL* Finnish Language research group, *R-GS* Gender Studies research group, *I* Intervention group, *T* Total number of participants in the session

## Data and Method

Our raw data consists of videotapes of the eight Change Laboratory sessions. The length of the sessions varied between 120 and 151 min. The total length of the eight sessions was 1109 min. There were altogether 4184 speaking turns in the eight sessions. The videotapes were transcribed.

As the first step in our analysis, we identified expansive learning actions in the transcripts. An expansive learning action was identified on the basis of (a) discerning the conversational episodes based on their substantive contents, (b) analyzing the turns of talk within each episode in terms of actions and formulating a preliminary description of the actions, (c) specifying the epistemic function of each action in the stream of learning actions. The epistemic function was determined using the framework of the seven expansive learning actions presented earlier.

As a second step, we identified non-expansive learning actions in the data. This was done by examining the contents and epistemic functions of the actions that were not identified as expansive. These actions were named descriptively, on the basis of their contents, without aiming at a theoretically systematic categorization. Technicalities and off-topic contents such as discussions on the timetables were separated and not included in the detailed analysis.

As a third step, we returned to the expansive learning actions to identify possible sub-types within them. This was done by examining all examples of a given expansive learning action (e.g., questioning), grouping the examples iteratively, and naming the groups. The resulting categorization of sub-types was used as the basis for counting the frequencies of expansive learning actions.

As a fourth step, we examined cyclicity of expansive learning actions at three levels, namely the level of the entire Change Laboratory process, the level of each Change Laboratory session, and the level of cross-session object-bound cycles. Since cyclicity implies recurrence, it was important to look for recurring smaller cycles within the intervention. To accomplish this, we needed an operational minimal criterion for expansive cyclicity. We decided that for the present analysis, such a minimal criterion of cyclicity is the appearance of at least four different expansive learning actions in a meaningful order within a session or within an object-bound cross-session cycle. By meaningful order we refer to the general directionality of the theoretically formulated expansive cycle. If the actions occur in an opposite or completely arbitrary order (e.g. implementation -> examining -> analysis -> questioning), the criterion is not fulfilled. On the other hand, if some actions appear in a different order from that presented in the ideal-typical theoretical model but the general order of the actions is still in accordance with the directionality of the theoretical cycle (e.g. questioning -> analysis -> modeling -> questioning -> examining), the criterion is fulfilled.

As a fifth step, we analyzed deviations between the instructional intentions of the interventionists and the actually accomplished learning process. We identified two types of deviations, namely (a) action-level deviations and (b) object-level deviations. Action-level deviations were those in which one or more expansive learning actions taken by the participants deviated from the dominant action planned by the interventionists for the given session. These deviations were typically surprises or disturbances that changed the course of the events for a limited period but did not change the overall object of learning; that is, after the deviation, the process returned to the

plan. Object-level deviations are those in which the object and therefore also the course of the entire expansive learning process are qualitatively changed. Qualitative change does not necessarily imply rejection of the previously articulated object – it can also mean substantive expansion of the existing object.

To identify the deviations, we needed to specify the instructional intentions of the interventionists. For this, we used the written plans of the interventionists as well as recordings of the planning discussions of the interventionist group. On this basis, we named the intended function of each Change Laboratory session in terms of the planned dominant expansive learning action and used this intention as point of comparison when examining what actually took place. Due to space limitations, the documents and conversations in which the instructional intentions and plans were explicated cannot be analyzed in this article.

## Expansive Learning Actions

Our research question 1.1 concerns the appearance and frequency of expansive learning actions in the Change Laboratory. As shown in Table 2, six of the seven expansive learning actions occurred in the data. The most frequent one was the action of analyzing the situation which occurred 113 times. The action of modeling occurred 64 times. The action of examining the new model occurred 44 times, and the action of questioning 36 times. The actions of implementing the new model and reflecting on the process were the least frequent ones, occurring 16 and 8 times respectively. The action of consolidating and generalizing did not occur in the data.

In terms of the overall effort, this Change Laboratory was more focused on questioning and analyzing the situation, modeling a new solution, and examining the model than on implementing the model and reflecting on the process. The relatively infrequent occurrence of actions of implementing and reflecting on the process, as well as the absence of actions of consolidation and generalization, may be to a large extent due to fact that we have not included in this analysis the follow-up sessions that took place several months later. We will return to the intriguing issue of the relative frequencies of the different expansive learning actions in the different phases of the overall process in the section devoted to cyclicity. All the expansive learning actions, placed within their respective sessions and connected to their respective content episodes and speaking turns are presented in Appendix 1.

Our research question 1.2 concerns the occurrence and frequency of non-expansive learning actions in the Change Laboratory. The total number of non-expansive learning actions was 68. As shown in Table 2, we found three types of non-expansive learning actions, namely informing, clarifying, and summarizing. The relatively large number of non-expansive actions may seem at odds with the assumedly expansive character of the overall learning process. However, these non-expansive actions are not inimical or opposite to expansive learning. They are simply not necessary elements of the epistemic process of ascending from the abstract to the concrete.

In the light of these findings, expansive learning emerges as a process interspersed with frequent non-expansive actions, some supportive, some neutral, some digressing, some also adverse to expansion. If in theory and in previous studies expansive

**Table 2** Types and frequencies of expansive and non-expansive learning actions in the Change Laboratory sessions

| Expansive learning actions | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| Questioning | 10 | 3 | 3 | 3 | 2 | 1 | 14 | 0 | 36 |
| Analyzing | 23 | 14 | 10 | 6 | 16 | 34 | 10 | 0 | 113 |
| Modeling | 3 | 1 | 6 | 22 | 5 | 1 | 17 | 9 | 64 |
| Examining | 0 | 0 | 0 | 0 | 14 | 0 | 0 | 30 | 44 |
| Implementing | 0 | 0 | 0 | 0 | 9 | 4 | 0 | 3 | 16 |
| Reflecting on the process | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 3 | 8 |
| TOTAL | 36 | 18 | 19 | 31 | 47 | 41 | 44 | 45 | 281 |
| Non-expansive learning actions | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | TOTAL |
| Informing | 10 | 8 | 7 | 3 | 10 | 3 | 7 | 1 | 49 |
| Clarifying | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Summarizing | 0 | 2 | 2 | 4 | 2 | 1 | 4 | 3 | 18 |
| TOTAL | 10 | 11 | 9 | 7 | 12 | 4 | 11 | 4 | 68 |
| All learning actions | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | TOTAL |
| TOTAL | 46 | 29 | 28 | 38 | 59 | 45 | 55 | 49 | 349 |
| Technicalities/ off-topic actions | S1 | S2 | S3 | S4 | S5 | S6 | S7 | S8 | TOTAL |
| TOTAL | 11 | 14 | 8 | 3 | 5 | 11 | 5 | 5 | 62 |

*S* session

learning has often been depicted as a relatively pure process, these findings depict it as a path emerging within a texture of various bypaths, or as a melody taking shape among background sounds and complementary, perhaps also competing tunes.

Our research question 1.3 concerns the sub-types of expansive learning actions. As summarized in Table 3, we found altogether 17 sub-types of expansive learning actions in our data.

The richest variety of sub-types was found within the actions of analyzing and modeling, both displaying five sub-types. As the follow-up sessions of the Change Laboratory are not included in the present analysis, it is understandable that the actions of implementing the model and reflecting on the process appear less rich in sub-types in our data. Logically, certain sub-types of implementing (*$I_3$: Actual use of the new model* and *$I_4$: Reporting on the use of the new model*) seem obvious and we have included them in Table 3 in italics, although they did not appear in our data.

The identification of 17 (or 19) sub-types of expansive learning actions may seem inflationary. However, we are here not aiming at a complete and fixed categorization of the sub-types. Our analysis merely points to the need to be aware of significant epistemic differences within expansive learning actions. It is not the same thing to criticize the existing practice ($Q_2$) and to question the proposed new development ($Q_3$), or to conduct historical analysis ($A_2$) and weigh alternative solutions ($A_5$). Future studies may shed light on possible requisite variety of sub-types of expansive learning actions within interventions aimed at expansive learning.

In sum, our analysis of the occurrence of expansive learning actions challenges purist notions of expansive learning. In a real-life formative intervention, expansive

**Table 3** Sub-types of expansive learning actions

| |
|---|
| Questioning |
| $Q_1$: Challenging participants into questioning |
| $Q_2$: Criticizing existing practice |
| $Q_3$: Questioning the proposed development |
| Analyzing |
| $A_1$: Articulating needs and ideas |
| $A_2$: Historical analysis |
| $A_3$: Articulating problems or challenges |
| $A_4$: Identifying contradictions |
| $A_5$: Weighing alternative solutions |
| Modeling |
| $M_1$: Sketching the initial idea of a model |
| $M_2$: Exploiting existing models |
| $M_3$: Naming and defining the model |
| $M_4$: Fixing the model in material or graphic from |
| $M_5$: Varying and adapting the model |
| Examining the model |
| $E_1$: Discussing the model critically |
| $E_2$: Enriching the model |
| Implementing |
| $I_1$: Demonstrating implementation |
| $I_2$: Preparing implementation |
| *$I_3$: Actual use of the new model* |
| *$I_4$: Reporting on the use of the new model* |
| Reflecting on the process |
| Consolidating and generalizing |

learning actions do not appear alone and in neatly standard shapes. We now turn to the analysis of cyclicity in this process.

## Cyclicity in the Learning Process

Cyclicity at the level of the entire Change Laboratory process may be examined with the help of Fig. 1.

Figure 1 shows that the first two sessions were dominated by questioning and analyzing. In the third and fourth sessions, as adjusted versions of the service palette model were discussed with the research groups, the actions of modeling become dominant, along with analyzing. In the fifth and sixth session, the models are examined and their implications are analyzed, and the actions of implementing show up for the first time. So far, the pattern is largely in line with the general sequence of the theoretical model of the expansive cycle.

However, this shift toward implementing does not continue. Instead, something unusual happens in the seventh session. The actions of questioning and modeling jump up and intensify again (with 14 occurrences of questioning and 17 occurrences of

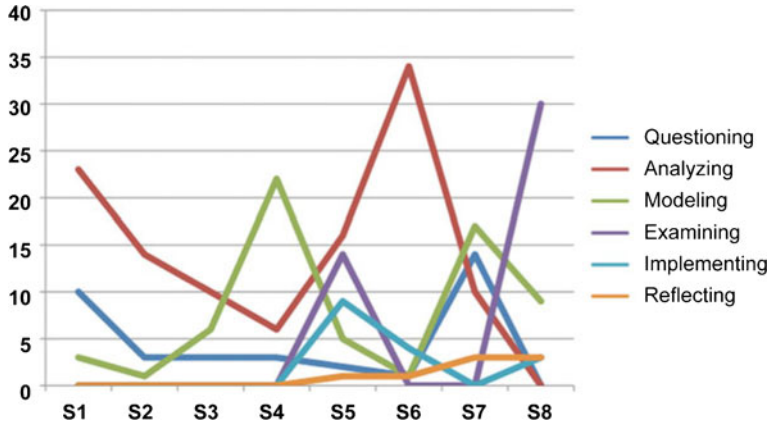


**Fig. 1** Evolution of frequencies of different expansive learning actions over the course of the Change Laboratory sessions

modeling). These actions are typically expected to happen in the early and middle parts of the cycle, so their strong reoccurrence toward the end of the intervention is highly interesting. In the eighth session, modeling remains fairly intensive (9 occurrences), and examining the model jumps up to a very intensive level (30 occurrences). This supports the observation that something unusual happened in the last two sessions.

It seems that there is an iterative loop within the cycle. First examining and implementing actions are taken in the fifth and sixth sessions. But instead of moving toward full emphasis on implementation as one would expect, the seventh session is saturated with actions of questioning and modeling, with a shift to a heavy concentration of actions of examining the model in the eighth session. The questioning, modeling and examining actions are done with great intensity in the last two sessions, more so than in the earlier sessions. In simplified terms, the overall cycle may be depicted as in Fig. 2. The inner cycle represents the iterative loop of sessions 7 and 8. The thicker arrows represent increased intensity of the given actions.

Figure 2 indicates that we may observe iteration and recurrence in expansive learning also at the level of the whole process of a formative intervention. In the next section we will examine what triggered such an iteration and what were its contents.

As can be seen in Table 2, four of the eight Change Laboratory sessions (sessions 5, 6, 7 and 8) contained a minimum of four different expansive learning actions, the criterion of cyclicity adopted in this paper. Of these, session 7 contains a sequence of the first three expansive learning actions plus actions of reflecting on the process, and session 8 contains a clear sequence of the last four expansive learning actions. These two might thus be seen as incomplete mini-cycles. Sessions 5 and 6 contain all or almost all of the six expansive learning actions found in our data. They may be seen as intermediate attempts to complete or integrate the learning process. However, session 7 breaks out of this completion and re-focuses intensively on questioning and modeling. In other words, session 7 practically repeats the incomplete cyclic pattern on sessions 1 to 4, only with greater intensity. Finally in session 8 the focus shifts to the second part of the expansive cycle, with unusually intensive examining of the new models.

In sum, session-level cyclicity is indeed found in our Change Laboratory process. But sessions are not predominantly characterized by complete or near-complete

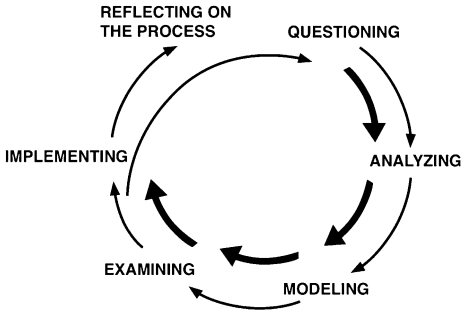


**Fig. 2** Overall shape of the expansive learning cycle in the library Change Laboratory

cycles; only session 5 and 6 have this character of completeness. Incomplete cyclicity (sessions 7 and 8) and no cyclicity (sessions 1 to 4) are actually more common at the level of individual sessions.

We found three clear cases of cross-session object-bound cyclicity in our data. This type of cyclicity is particularly interesting in that it demonstrates the holding power and continuity of expansive mini-cycles between and across temporally discrete intervention sessions. The three cases are focused on (1) the management of research data in the Cognitive Science research group, (2) the introduction and development of the FeedNavigator service, and (3) the emergence and evolution of pyramid models of clients and services.

The first case spanned from session 2 through session 3 to session 5. It started from a need expressed by members of the Cognitive Science research group. The library staff engaged in an expansive effort to identify and negotiate possible institutional arrangements for high-quality storage of massive amounts of digital imaging data. These efforts bumped into lacking infrastructures and rules at the university and national levels, which meant that the storage effort fizzled out. Parallel to this effort, and eventually replacing it, the library staff worked with the research group and produced a quick reference guidebook for the local management of research data within the research group. The quick reference guide was actually completed and implemented in practice. A large part of the work on the quick reference guide was done in knotworking meetings between the librarians and the research group members outside the Change Laboratory sessions. This mini-cycle would deserve a detailed analysis of its own but it cannot be presented here due to space limitations.

We will take a closer look at the second case of cross-session object-bound cyclicity, focused on the introduction and development of the FeedNavigator service. The FeedNavigator is a freely available web-based current awareness service, developed in Helsinki University medical campus library for tracking new publications, especially journal articles (http://www.terkko.helsinki.fi/feednavigator/ ).

We went through all sessions and looked for episodes in which the FeedNavigator topic was connected to expansive learning actions. Such episodes appeared in sessions 1, 2, 3 and 5 (see Table 4). In the first and second session FeedNavigator appeared in actions of analysis. In the third session FeedNavigator was connected to the action of questioning. In the fifth session FeedNavigator was tied to actions of questioning, implementing, examining, and modeling.

The FeedNavigator service was first taken up in first session. Video clips of library client interviews were shown to the participants to trigger analysis of clients' needs. In the clips clients were asking if there existed any way to get timely information

about new publications in one's own field of research. A librarian brought up the FeedNavigator service as a possible solution. This tool was originally developed for the field of medicine and it was not clear how it might work in humanities and social sciences. Nevertheless the librarians decided to introduce the FeedNavigator to the pilot research groups involved in the Change Laboratory.

In the second session, with the presence of representatives from the four pilot research groups, two video clips were shown to facilitate analysis of the clients' needs and possible ways to meet them. The first clip was the same client interview that was shown in the first session; the second clip included a librarian's response in which he proposed the FeedNavigator as a solution. Researchers showed tentative interest in the service, but they also took up their specific needs such as tracking new books or court cases. Clients also doubted whether journals in their field could be included in the service. Librarians promised to find out if and how the researchers' specific needs could be met.

In the third session the action of questioning appeared for the first time. A researcher from the Cognitive Science research group who did not attend the previous meeting wanted to hear what kind of service FeedNavigator is. After hearing a short introduction he responded by stating that he already had a similar service in use but it was not FeedNavigator. Clearly surprised, librarians and interventionist asked if the alternative service had all same features as FeedNavigator. After hearing the researcher's response, one of the librarians admitted that the alternative service actually resembled FeedNavigator. Another librarian continued defending the FeedNavigator as a unique tracking tool.

In the fifth session the learning action of examining occurred for the first time. Librarians, together with a researcher from Communication Law group, discussed how court cases might be included in the FeedNavigator. They concluded that a new category "cases" should be included in the FeedNavigator service and that the library would try to include court cases from the most important countries into FeedNavigator. In this session also two short phases of questioning appeared. An interventionist emphasized that it is not enough that librarians believe in the service, the benefits of the service must also be concrete to the users. Another action of examining was taken as an interventionist asked how one could create a personal profile in the FeedNavigator. This led to an action of implementing as librarians started to demonstrate the creation of a personal profile. This prompted a researcher from Cognitive Science to point out a usability problem in the service – a shift back to examining.

The discussion shifted again to implementing as an interventionist asked a specific question related to defining searches in the FeedNavigator. A librarian demonstrated how this procedure is done. This triggered a joint conversation between librarians, researchers and interventionists in which the need for more hands-on training was explicated. After that the conversation shifted back to examining: usability problems and shortcomings of FeedNavigator were listed and needed improvements were identified. The FeedNavigator mini-cycle ended in an action of modeling in which a new working method for the library, hands-on coaching and guidance at the client's work site, was conceptualized at a general level.

The FeedNavigator mini-cycle contains five different expansive learning actions. While cyclic, it does not proceed in predetermined order, as the action of questioning appears only after actions of analyzing and modeling, and the cycle ends with an action of modeling. In fact, without the action of questioning taken by the Cognitive

**Table 4** Expansive learning actions related to the FeedNavigator service in Change Laboratory sessions 1, 2, 3 and 5

| Turns | Session-episode and contents | Expansive learning actions |
|---|---|---|
| | 1-2 Video samples: client interviews (124–463) | |
| 433–462 | Tracking of publications | $A_1$ |
| | 2-2 Video samples: client interviews and excerpts from the first session (36–89) | |
| 52–88 | Tracking of publications | $A_1$ |
| | 2-4 Clients' responses to the service model (124–260) | |
| 132–169 | Needs and wishes of Gender Studies research group | $A_1$ |
| 194–216 | Needs and wishes of Communication Law research group | $A_1$, $A_3$ |
| 217–235 | Needs and wishes of Cognitive Science research group | $A_1$ |
| | 3-5 Specific needs of Cognitive Science research group (407–639) | |
| 437–446 | Librarians introduce the FeedNavigator-service | $M_3$ |
| 447–498 | Researcher introduces an alternative service | $Q_2$ |
| | 5-2 Review of services offered to the research groups (2–288) | |
| 105–160 | Attaching court cases in FeedNavigator for Communication Law research group | $E_2$ |
| | 5-3 FeedNavigator service (289–475) | |
| 289–295 | FeedNavigator presentation | $M_3$ |
| 296 | Benefits of FeedNavigator for the user unverified | $Q_1$ |
| 297–299 | Including relevant journals in FeedNavigator | $E_2$ |
| 300 | Benefits of FeedNavigator for the user unverified | $Q_1$ |
| 301–321 | Including relevant journals in FeedNavigator | $E_2$ |
| 322–373 | Viewing just added journals in FeedNavigator | $E_2$ |
| 373–400 | How to create a personal profile in FeedNavigator | $E_2$ |
| 401–410 | Creation of the personal profile in FeedNavigator | $I_1$ |
| 411–416 | Usability problem in the interface of FeedNavigator | $E_1$ |
| 417–444 | Delimiting a search in FeedNavigator | $I_1$ |
| 445–457 | Need for more hands-on FeedNavigator training | $I_2$ |
| 458–464 | FeedNavigator training as part of the larger whole | $E_1$ |
| 465–471 | Need for specific categories in FeedNavigator for law and linguistics | $E_2$ |
| 472–474 | Compiling improvement ideas for FeedNavigator | $E_2$ |
| 475 | Importance of hands-on guidance of the client | $M_3$ |

Legend: Q = questioning; A = analyzing; M = modeling; E = examining; I = implementing

Science researcher (session-episode 3–5, turns 447–498 in Table 4), the entire cycle might have remained rather top-down and non-expansive. The questioning triggered further examining of the FeedNavigator model and led to general conclusion that added to the overall model of the library's future work.

The third case of cross-session object-bound cyclicity, the emergence and evolution of pyramid models of clients and services, occurred in sessions 7 and 8. It was an object-level deviation from the instructional intentions of the interventionists that significantly altered the course of expansive learning. Therefore, we analyze it in detail in the next section.

## Deviations from Instructional Intentions

Our third research question has to do with deviations between the interventionists' instructional intentions and the actual learning actions taken by the participants in a Change Laboratory. We first identified action-level deviations. The seven action-level deviations are summarized in Table 5.

As Table 5 shows, with the exception of one client-initiated deviation (the FeedNavigator issue discussed in the preceding section), the action-level deviations were actions of questioning the contents of the intervention and the model developed for the future of the library's work. These actions were initiated by two members of the library staff. We might say that these two practitioners acted as voices of critical resistance and doubt throughout the process of expansive learning. Having such "resisting" participants in an intervention seems an important, if not a necessary prerequisite for attaining the self-reflective and argumentative aspect of expansive learning (Sannino 2010). The reception, handling and consequences of these kinds of action-level deviations deserve separate analyses in the future.

In our data we found one case of object-level deviation. This was the emergence and evolution of pyramid models of clients and services that took place in sessions 7 and 8. The intended function of session 7 was to summarize and stabilize the model of the new service palette the library would offer to research groups. The intended functions of session 8 were to sketch the implications of the new service palette for the internal organization of the library and to construct a plan for the implementation of the new model.

As shown in Table 6, what actually happened was that early in session 7, Librarian 2 questioned the sufficiency of the service palette model and suggested that a qualitatively different model is needed, namely a pyramid depicting services ranging from standardized packages at the bottom to tailor-made specialized services at the top. This initiative may be seen as an elaboration and expansion of the questioning actions taken by the same practitioner earlier, in sessions 1 and 2 (see Table 5), in which he argued that the starting point of this project should be uniform courses, not tailor-made services.

The questioning and suggestion were endorsed by an interventionist and picked up by other library practitioners. The discussion led to an assignment for session 8: the library staff would produce a new pyramid model depicting the range of services differentiated according to the degree of standardization vs. customization. A third space (Gutiérrez 2008) was opened for discussion and negotiation between the instructionally intended script proposing customized services and the counter-script of Librarian 2 emphasizing standard training courses.

**Table 5** Action-level deviations from instructional intentions

| Turns | SESSION AND ITS INTENDED FUNCTION<br>Session-episode and contents | Expansive learning actions |
|---|---|---|
| | S1: QUESTIONING ($Q_1$) AND ANALYZING ($A_1$) | |
| | 1.1 Introduction (1–123) | |
| 72 | Librarian 1: The starting point should be the mapping of information needs, not the arbitrary offering of services | $Q_3$ |
| | 1.3 Themes of Library (463–525) | |
| 466 | Librarian 2: The starting point of this project should be uniform courses, not tailor-made services | $Q_2$,$Q_3$, $M_2$ |
| | S2: QUESTIONING ($Q_1$) AND ANALYZING ($A_1$) | |
| | 2.4 Clients' responses to the service model (124–260) | |
| 240–241 | Librarian 2: The starting point of this project should be uniform courses, only after that it is possible to evaluate the need for tailor-made services and specific needs | $Q_2$ |
| | S3: MODELING ($M_1$) | |
| | 3.5 Proposal for the CS group (407–639) | |
| 447–498 | Researcher from Cognitive Science: I use an alternative service for tracking new publications; the uniqueness and superiority of the FeedNavigator offered by the librarians is questionable | $Q_2$ |
| | S7: MODELING ($M_3$ and $M_5$) | |
| | 7.2 Summarizing the researcher service model (4–141) | |
| 83–91 | Librarian 2: It is important to create larger structures and not to deal with details without clear destination and end point | $Q_2$, $Q_3$ |
| | 7.3 Definition of library work and its clients (141–291) | |
| 155 | Librarian 2: The best place to encounter clients is within the existing institutions and there is no need for librarians to meet clients in their premises | $Q_2$ $Q_3$ |
| 208–219 | Librarian 2: It is useless to profile clients as research groups because clients are anyway profiling themselves as individuals | $Q_3$ |

Mass-produced standard services and customized, co-constructed services are produced for different clients and need different organizational arrangements and competences that have to be taken into account in designing the division of labor and the organizational chart of the library. The service palette model did not include this distinction. In this sense, opening up the creation of pyramid models was a significant qualitative expansion of the object of the entire intervention. The expansion of the object was not merely addition of another picture to the model. The pyramid models became important mediators and integrators between the palette representation of services and the subsequent evolving organization charts. This expansion is schematically depicted in Table 7.

The assignment agreed upon in session 7, to produce a pyramid model for the next session, actually generated not just one but two different pyramid models (Fig. 3).

**Table 6** Object-level deviation from instructional intentions in sessions 7 and 8

| Turns | SESSION AND ITS INTENDED FUNCTION<br>Episode and its contents | Expansive learning actions |
|---|---|---|
| | S7: MODELING | |
| | 7.2 Summarizing the service palette model (4–141) | |
| 52–56 | Librarian 2: The present service palette model for research groups is not enough, a broader pyramid model is needed, depicting the range of services from standardized to tailor-made and specialized ones | $Q_3$, $M_1$ |
| 57–61 | Interventionist: Task for the next session: categorization of services into standardized and tailor-made ones | $M_3$, $M_5$ |
| 62–68 | Librarian 3: Specific tailored services are impossible to deliver to all research groups | $M_4$ |
| 69 | Interventionist: Let's reformulate the task for the next session; depict the structure of services by using a pyramid model | $M_3$ |
| 70–73 | Librarian 2: It is very important that services for researchers are not separated from the overall picture of our services | $M_2$ |
| | Interventionist: I repeat the task for the next session – depict the structure of services by using a pyramid model | |
| | 7.3 Definition of library work and its clients (141–291) | |
| 173–179 | Interventionist: A pyramid model could work as a tool for dividing services for researchers into standardized and tailor-made ones | $M_3$, $M_4$ |
| 267–272 | Interventionist: The first challenge for the next session could be the differentiation and categorization of standardized services and customized services with the help of the pyramid model | $M_4$, $M_5$ |
| | S8: MODELING AND IMPLEMENTING | |
| | 8.2 Assignments: Presentation of models constructed (2–135) | |
| 7 | Librarian 2 [presenting the first pyramid model; see Fig. 3]: This model shows how training and specific services look from the point of view of researchers; with the help of the model it is possible to standardize most of the services for researchers and only after that to identify specific needs for tailor-made services; the researcher's role as a passive recipient of tailor-made services is problematic | $M_4$ |
| 14–18 | Interventionist: Instead of the term "passive" we could call them "unique one-time services" | $E_1$ |
| 19–21 | Librarian 2: Customization and the notion of a service palette give an unsatisfactory image of serving a passive object | $E_1$ |
| 22–26 | Interventionist: Instead of customization and tailor-made services, the concept of "co-configuration" could be used | $E_1$ |
| 27–31 | Librarian 2: The task is to compile different standardization efforts into a unified set of campus-wide training services | $E_1$ |
| 32–36 | Interventionist-consultant: All the new services are based on existing basic services | $E_1$ |
| 37–43 | Librarian 4 [presenting a second pyramid model, see Fig. 3]: In addition to training this model also includes the dimensions of "publicity and marketing" and "co-configuration and communication with the client" | $M_4$ |
| 44 | Interventionist: These pyramid models could be used to mediate the idea of researcher services to the clients | $E_1$, $I_2$ |
| 68–84 | Librarian 5 [commenting on the 2nd pyramid model]: The higher up you go, the more co-configuration and client communication you will need | $E_1$ |

**Table 6** (continued)

| Turns | SESSION AND ITS INTENDED FUNCTION<br>Episode and its contents | Expansive learning actions |
|---|---|---|
| | Interventionist: Shouldn't we then turn the sign for the co-configuration dimension upside down; when going up towards customized services, co-configuration and client communication increase | |
| | Librarian 4: Yes, of course the sign must be turned upside down | |

The first pyramid model, created by Librarian 2, saw the customized services of the service palette in terms of treating the clients as passive recipients. As shown in Table 6, this was contested by an interventionist. More importantly, the second pyramid model, presented by Librarian 4, saw the customized services in an opposite way, as requiring more communication with the clients. Initially the symbol for this dimension (on the right hand side of the second pyramid model in Fig. 3) was drawn as if communication would decrease with customization; this mistake was taken up and emphatically corrected in the discussion (in Fig. 3, the corrected version is

**Table 7** The pyramid model deviation as expansion of the object

| | Traditional object of library's work with researchers | Hypothesized new object of libraries work with researchers | New object actually created by the participants |
|---|---|---|---|
| Description of the object | Individual researcher's request for publication or publication-related information | A research group's need and customized services for the management of data, publishing, and monitoring the global flow of new research findings | Research group's specific needs and customized services in relation to standardized services |
| Models related to the object | Existing hierarchical organization chart | Service palette for research groups plus an organization chart supporting customized services and knotworking with research groups | Service palette and organization chart mediated by a pyramid model of services ranging from standardized to customized ones |
| Socio spatial expansion | | From individual client and individual librarian to research group as a client knotworking with multiple librarians of complementary expertise | Research groups and individuals as clientele interacting with collective library expertise by knotworking and by traditional service encounters |
| Temporal expansion | | From discrete service events to long-term partnerships | Long-term partnerships and discrete service events (e.g., standard courses) integrated |

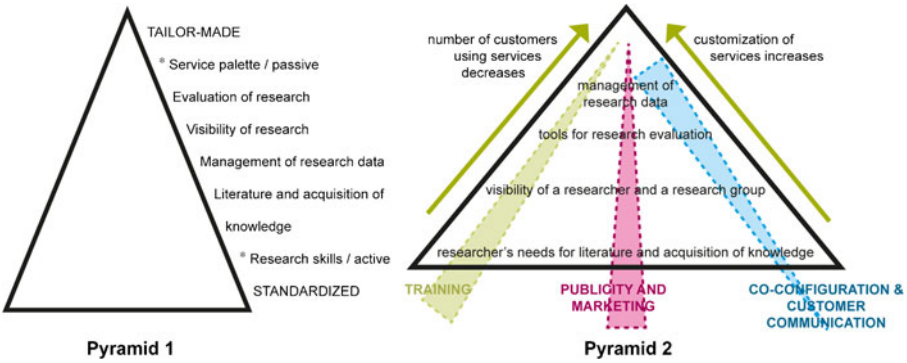


**Fig. 3** Two complementary pyramid models produced by the library practitioners

shown). The third space was thus traversed not primarily by means of negotiation between the interventionists and Librarian 2, but by means of another practitioner-initiated model (the second pyramid) that went beyond the initial opposition and integrated the two perspectives in a meaningful manner.

Overall our analyses in this section point to the crucial importance of deviations from instructional intentions. Action-level deviations were important in that they served as voices of critical resistance and doubt throughout the process of expansive learning. Certain action-level deviations may also be seen as early seeds that were expanded into the major object-level deviation toward the end of the intervention. Without the object-level deviation in the last two sessions of the Change Laboratory, the entire process might have remained rather contained, sterile and possibly of little practical consequences. The object-level deviation led to a burst of modeling and examining actions that intensified and energized the process, as if the agency of the practitioners were finally starting to break out of the confines of traditional top-down development. Further studies will follow up the consequences and sustainability of the expansive learning analyzed here.

## Conclusion

In this paper we have examined the empirical usability and methodological rigor afforded by the theory of expansive learning. We have developed and tested a set of methodological solutions that allow us to depict the detailed longitudinal dynamics of expansive learning within a formative Change Laboratory intervention.

Specifically, we have analyzed three aspects of expansive learning, namely (1) expansive and non-expansive learning actions, (2) cyclicity, and (3) deviations from instructional intentions. Our findings on these three aspects enrich the current understanding of expansive learning.

First of all, our analysis of the occurrence of expansive learning actions shows that in a real-life formative intervention, expansive learning actions do not appear alone. In our case, expansive learning actions emerged in the midst on a fairly large number and diversity of non-expansive learning actions, some indifferent, some supportive, some adverse to the process of expansive learning. Furthermore, we identified 17 sub-types of expansive learning actions in our data (and another two logically

obvious ones). Our findings point to the need to be aware of epistemic differences between and possible requisite variety of sub-types within expansive learning actions.

Secondly, our analyses of cyclicity of expansive learning revealed an iterative loop within the overall cycle of the Change Laboratory. This indicates that iteration and recurrence can happen in expansive learning also at the level of the whole process of a formative intervention, at least when an object-level deviation triggers a qualitative change in the object of the overall learning process. We also found cyclicity within individual sessions of the Change Laboratory, but sessions were not predominantly characterized by complete or near-complete cycles. Incomplete cyclicity and no cyclicity at all were more common at the level of individual sessions. Finally, we found three cases of cross-session object-bound cyclicity in our data. This type of cyclicity is particularly important in that it demonstrates the power of objects to provide continuity between and across temporally discrete intervention sessions.

Thirdly, in light of the large number of non-expansive learning actions it is particularly important to look into the transformation of the object in the course of this intervention. As shown in Table 7, the traditional object of the library was indeed expanded both socio-spatially and temporally. Most importantly, the expansion was not limited to a fulfillment of the working hypothesis of the interventionists. The practitioners constructed a significant unanticipated set of models – the pyramids – which made it possible to differentiate and integrate standardized and customized services in a comprehensive manner. Our analyses of deviations from instructional intentions and plans demonstrate that expansive learning is indeed more than mere replication or imposition of the interventionists' plans. The very process is punctuated by deviations which open up space for learner agency and creation of truly new solutions and concepts. The reception, negotiation and expansive bridging of these deviations are exciting challenges for further research.

Expansive learning is an emerging, historically new form of learning needed in qualitative transformations of collective human activities, particularly in work organizations. This paper, along with some recent and forthcoming papers (e.g., Engeström and Sannino 2011; Schaupp 2011), brings the study of expansive learning to the level of comprehensive, action-level analyses of entire lengthy cycles of learning in formative interventions. The three aspects of expansive learning addressed in this paper are not exhaustive; additional aspects need to be systematically examined. Such studies also need to engage in comparisons between expansive learning processes across multiple formative interventions in different work settings and cultures.

Our study testifies to the creative potential of working communities when they are given a chance to engage in serious efforts of collective redesign of their activity systems. The librarians and their clients produced a comprehensive palette of services for researchers and research groups – something that did not exist before the Change Laboratory. Perhaps more importantly, the librarians worked out and began to implement in practice their own version of the idea of knotworking as a concept to guide the long-term development of the library's organization and way of working (see Engeström et al. 2012).

Our analysis serves the librarians as a means for reflection and planning for next steps in their journey of expansive learning. More generally, our findings may be used by interventionists and working communities as tools when preparing and designing formative interventions aimed at expansive learning cycles.

## Appendix 1

**Table 8** Expansive learning actions in change laboratory sessions

| Turns | Action [1)] |
|---|---|
| **S1: Q1 & A1** | |
| 1.1 Introduction (1–123) | |
| 72 | Q3 |
| 73–100 | A1 |
| 1.2 Video samples: client interviews (124–463) | |
| 124–127 | A3 |
| 130–131 | A3 |
| 135–141 | A3 |
| 141 | Q1 |
| 142–177 | A3 |
| 177 | Q1 |
| 178–185 | A3 |
| 186–198 | M1 |
| 199–213 | Q1 |
| 214–225 | A3 |
| 232 | Q2 |
| 233 | A1 |
| 234–235 | Q2 |
| 236–248 | A3 |
| 249–250 | A1 |
| 251–273 | Q2, M1 |
| 275–284 | A5 |
| 288–290 | A5 |
| 292–304 | A3 |
| 306–351 | A3 |
| 352–385 | A3 |
| 386–419 | A1 |
| 421–432 | A1 |
| 433–463 | A1 |
| 1.3 Themes of Library (463–525) | |
| 466 | Q2, Q3, M2 |
| 467–489 | A1, A3 |
| 491–493 | A1 |
| 494 | Q1 |
| 495–515 | A3 |
| 516–525 | A1 |
| 1.4 Closure (526–546) | |
| **S2: Q1 & A1** | |
| 2.1 Introduction (1–36) | |
| 1 | Q1 |
| 2.2 Video samples: client interviews and excerpts from the first session (36–89) | |
| 37–51 | A3 |
| 52–88 | A1 |
| 2.3 Data management and Publication tracking (89–123) | |
| 2.4 Clients' responses to the service model (124–260) | |
| 124–131 | A1 |
| 132–169 | A1 |
| 170–193 | A1, A3 |
| 194–216 | A1, A3 |
| 217–235 | A1 |
| 236–240 | A1 |
| 240–241 | Q2 |
| 242–245 | A1 |
| 246–250 | M2 |
| 253–260 | A1 |
| 2.5 Clients' responses to communication, facilities, meeting places (261–313) | |
| 261–283 | A1 |
| 284–294 | Q1 |
| 301–306 | A1 |
| 2.6 Closure (315–318) | |
| **S3: M1** | |
| 3.1 Introduction (1–29) | |
| 3.2 Proposal for the CL group (29–206) | |
| 40–101 | M5 |
| 109–139 | M5 |
| 156–183 | Q1 |
| 3.3 Proposal of communication and facilities (207–255) | |
| 212–233 | A1 |
| 3.4 Management of the research database TUHAT (256–407) | |
| 265–350 | A3 |
| 355–370 | A1 |
| 371–380 | Q2 |
| 381–390 | A1 |
| 391–396 | A1 |
| 397–407 | A3 |
| 3.5 Proposal for the CS group (408–640) | |
| 415–436 | M5 |
| 437–446 | M5 |
| 447–498 | Q2 |
| 501–583 | M5 |
| 584–597 | M5 |
| 598–624 | A1 |
| 625–627 | A3 |
| 638–639 | A1 |
| 640 | A3 |
| 3.6 Closure (640–644) | |
| **S4: M1** | |
| 4.1 Introduction (1–26) | |
| 4.2 Proposal for both groups about needs on literature and acquisition of knowledge (27–432) | |
| 47–49 | M5 |
| 97–214 | M5 |
| 219–239 | M5 |
| 240–255 | A5 |
| 255–259 | M5 |
| 260–269 | M5 |
| 282–292 | A1 |
| 293–324 | M5 |
| 325–238 | M5 |
| 239–387 | M5 |
| 388–409 | M5 |
| 410–428 | M5 |
| 429–432 | M5 |
| 4.3 Proposal for both groups about research evaluation (432–522) | |
| 432–452 | M5 |
| 453–460 | M5 |
| 461–476 | M5 |
| 476–494 | M5 |
| 495–518 | M5 |
| 4.4 Proposal for both groups about Management of research data (523–662) | |
| 523–527 | M5 |
| 528–540 | M5 |
| 541–554 | M5 |
| 555–565 | M5 |
| 566–578 | M2 |
| 590–602 | A1 |
| 603–605 | Q1 |
| 606–628 | A1 |
| 629–639 | Q1 |
| 640–648 | A3 |
| 649–658 | M1, Q1 |
| 660–662 | A1 |
| 4.5 Closure (663–673) | |
| **S5: I2** | |
| 5.1 Introduction (1) | |
| 5.2 Review of services offered to the research groups (2–288) | |
| 2–30 | A1 |
| 30–36 | A1 |
| 37–47 | A1 |
| 48–59 | A1 |
| 60–71 | A3 |
| 72–74 | A1 |
| 75–77 | A1 |
| 98–104 | A1 |
| 105–160 | E2 |
| 160–180 | A3 |
| 181–194 | M1 |
| 197–208 | A1 |
| 209–213 | A1 |
| 216–236 | A3 |
| 237–277 | A3, M1 |
| 278–288 | M1 |
| 5.3 FeedNavigator service (289–475) | |
| 289–295 | M5 |
| 296 | Q1 |
| 297–299 | E2 |
| 300 | Q1 |
| 301–321 | E2 |
| 322–373 | E2 |
| 373–400 | E2 |
| 401–410 | I1 |
| 411–416 | E1 |
| 417–444 | I1 |
| 445–457 | I2 |
| 458–464 | E1 |
| 465–471 | E2 |
| 472–474 | E2 |
| 475 | M3 |
| 5.4 E-Book service (476–559) | |
| 5.5 Implementation schedule (559–757) | |
| 476–506 | E2 |
| 507–515 | E1 |
| 516-524 | E2 |
| 525–536 | E1 |
| 536–558 | I2 |
| 559–622 | I2 |
| 622–639 | I2 |
| 639–663 | E2 |
| 679–695 | I2 |
| 696–711 | I2 |
| 718–735 | I2 |
| 736–742 | RP |
| 5.6 Presentatation: new library building KAISA (758–784) | |
| 772–774 | A1 |
| 775–778 | A1 |
| 779–783 | A1 |
| 5.7 Closure (784) | |
| **S6: I2** | |
| 6.1 Introduction (1–3) | |
| 6.2 Presentatation: new library building KAISA (4–170) | |
| 10–16 | Q2 |
| 17–52 | A5 |
| 53–60 | A1 |
| 61–83 | A3 |
| 84–97 | A3 |
| 104 | A2 |
| 105–108 | A3 |
| 109–114 | A1 |
| 115–116 | A1 |
| 118–121 | A3 |
| 123–127 | A5 |
| 128–134 | A1 |
| 135–141 | A3 |
| 143–163 | A3 |
| 6.3 Services offered for the groups (171–437) | |
| 176–186 | M1 |
| 187–195 | A3 |
| 195–199 | A1 |
| 199–203 | A1 |
| 206-211 | A1 |
| 212-214 | A1 |
| 214-237 | A5 |
| 237 | A1 |
| 239–258 | I2 |
| 259 | A1 |
| 260–281 | A3 |
| 282–299 | A1 |
| 300–317 | A3 |
| 317–318 | A1 |
| 319–321 | A1 |
| 322–337 | A3 |
| 338–351 | A1 |
| 351–365 | A1 |
| 366–377 | I2 |
| 378–396 | A3 |
| 397–418 | A1 |
| 419–424 | A1 |
| 425–437 | A3 |
| 6.4 Closure (438–471) | |
| 438–440 | I2 |
| 449 | RP |
| 450–459 | I2 |
| 459–468 | A1 |
| **S7: M3 & M5** | |
| 7.1 Introduction (1–3) | |
| 7.2 Summarizing the researcher service model (4–141) | |
| 49–51 | Q1 |
| 52–56 | Q3, M1 |
| 57–61 | M3, M5 |
| 62–68 | M4 |
| 69 | M3 |
| 70–73 | M2 |
| 74–75 | M1, RP |
| 78–82 | Q3 |
| 83–91 | Q2, Q3 |
| 92–103 | M2 |
| 103–104 | M3 |
| 105–106 | Q2 |
| 108 | Q3 |
| 109–123 | A3 |
| 123–131 | A3 |
| 131 | RP |
| 7.3 Definition of library work and its clients (141–291) | |
| 141–148 | A3 |
| 148–154 | A3 |
| 154 | Q1 |
| 155 | Q3 |
| 159–160 | A3 |
| 161–162 | A3 |
| 162–164 | Q2 |
| 165–172 | A1 |
| 173–179 | M3, M4 |
| 179–189 | Q1 |
| 189–193 | A3 |
| 194 | Q3 |
| 195–207 | Q1 |
| 208–219 | Q3 |
| 219–223 | M1 |
| 223–231 | A3 |
| 232–241 | A3 |
| 242–248 | M1 |
| 248–252 | M4 |
| 253 | RP |
| 254–266 | M1 |
| 267–272 | M4, M5 |
| **S8: M3, M5 & I2** | |
| 8.1 Introduction (1) | |
| 8.2 Assignments: Pyramid and other models (2–135) | |
| 7 | M5 |
| 14–18 | E2 |
| 19–21 | E1 |
| 22–26 | E2 |
| 27–31 | E2 |
| 32–36 | E2 |
| 37–43 | M4, M5 |
| 44 | E2, I2 |
| 45–53 | E2 |
| 53 | M4, M5 |
| 54–63 | E2 |
| 64–84 | E2 |
| 85–94 | E2 |
| 95–102 | E2 |
| 103–125 | E2 |
| 126 | M4, M5 |
| 8.3 Organization chart (136–247) | |
| 136–137 | M4 |
| 138–151 | E2 |
| 152–159 | E2 |
| 160–177 | E2 |
| 177–185 | E2 |
| 186–199 | E2 |
| 200–213 | E2 |
| 214–237 | E2 |
| 238–244 | E2 |
| 245–247 | E2 |
| 8.4 Challenges and support of Knotworking and researcher services (248–288) | |
| 253–268 | E2 |
| 269–279 | RP |
| 281–287 | E2 |
| 8.5 Tasks with 4 pilots during the following months (289–319) | |
| 289–319 | I2 |
| 8.6 Wider issues reaching outside of City Centre Campus Library (320–349) | |
| 320–325 | E1 |
| 329–349 | E1 |
| 8.7 How to plant new ideas in the daily work (350–362) | |
| 350–356 | I2, E2 |
| 357–362 | E2 |
| 8.8 Approaching research groups participating in research evaluation (363–391) | |
| 363–369 | M1 |
| 370–372 | E2 |
| 373–380 | E1 |
| 381–391 | E1 |
| 8.9 Closure (392–422) | |
| 410 | RP |
| 411-422 | RP |

[a] Abbreviations of the sub-types of expansive learning in column "Action" are explained in Table 3

## References


Davydov, V. V. (1990). *Types of generalization in instruction: Logical and psychological problems in the structuring of school curricula*. Reston: National Council of Teachers of Mathematics.

Davydov, V. V. (2008). *Problems of developmental instruction: A theoretical and experimental psychological study*. New York: Nova.

Dochy, F., Engeström, Y., Sannino, A., & van Meeuwen, N. (2011). Interorganisational expansive learning at work. In F. Dochy, D. Gijbels, M. Segers, & P. Van den Bossche (Eds.), *Theories of learning for the workplace: Buiding blocks for training and professional development programs* (pp. 125–147). London: Routledge.

Engeström, Y. (1987). *Learning by expanding: An activity-theoretical approach to developmental research*. Helsinki: Orienta-Konsultit.

Engeström, Y. (2007). Putting Vygotsky to work: The Change Laboratory as an application of double stimulation. In H. Daniels, M. Cole, & J. V. Wertsch (Eds.), *The Cambridge companion to Vygotsky* (pp. 363–382). Cambridge: Cambridge University Press.

Engeström, Y. (2008). *From teams to knots: Activity-theoretical studies of collaboration and learning at work*. Cambridge: Cambridge University Press.

Engeström, Y. (2011). From design experiments to formative interventions. *Theory & Psychology, 21*(5), 598–628.

Engeström, Y., & Sannino, A. (2010). Studies of expansive learning: foundations, findings and future challenges. *Educational Research Review, 5*(1), 1–24.

Engeström, Y., & Sannino, A. (2011). Discursive manifestations of contradictions in organizational change efforts: a methodological framework. *Journal of Organizational Change Management, 24*(3), 368–387.

Engeström, Y., & Sannino, A. (2012). Whatever happened to process theories of learning? *Learning, Culture and Social Interaction, 1*, 45–56.

Engeström, Y., Virkkunen, J., Helle, M., Pihlaja, J., & Poikela, R. (1996). Change laboratory as a tool for transforming work. *Lifelong Learning in Europe, 1*(2), 10–17.

Engeström, Y., Engeström, R., & Vähäaho, T. (1999). When the center does not hold: The importance of knotworking. In S. Chaiklin, M. Hedegaard, & U. J. Jensen (Eds.), *Activity theory and social practice* (pp. 345–374). Aarhus: Aarhus University Press.

Engeström, Y., Miettinen, R., & Punamäki, R.-L. (Eds.). (1999). *Perspectives on activity theory*. Cambridge: Cambridge University Press.

Engeström, Y., Engeström, R., & Suntio, A. (2002). Can a school community learn to master its own future? An activity-theoretical study of expansive learning among middle school teachers. In G. Wells & G. Claxton (Eds.), *Learning for life in the 21st century: Sociocultural perspectives on the future of education* (pp. 211–224). London: Blackwell.

Engeström, Y., Puonti, A., & Seppänen, L. (2003). Spatial and temporal expansion of the object as a challenge for reorganizing work. In D. Nicolini, S. Gherardi, & D. Yanow (Eds.), *Knowing in organizations: A practice-based approach* (pp. 151–186). Armonk: Sharpe.

Engeström, Y., Kaatrakoski, H., Kaiponen, P., Lahikainen, J., Myllys, H., Rantavuori, J., & Sinikara, K. (2012). Knotworking in academic libraries: two case studies from the University of Helsinki. *Liber Quarterly, 21*(3/4), 387–405.

Fenwick, T. (2006). Toward enriched conceptions of work learning: participation, expansion, and translation among among indiviuals with/in activity. *Human Resource Development Review, 5*(3), 285–302.

Foot, K. (2001). Cultural-historical activity theory as practical theory: illuminating the development of a conflict monitoring network. *Communication Theory, 11*(1), 56–83.

Gal'perin, P. Y. (1969). Stages in the development of mental acts. In M. Cole & I. Maltzman (Eds.), *A handbook of contemporary Soviet psychology* (pp. 249–273). New York: Basic Books.

Gould, S. J. (1987). *Time's arrow, time's cycle*. Cambridge: Harvard University Press.

Greenstein, D. (2010). Strategies for sustaining the university library. *Portal: Libraries and the Academy, 10*(2), 121–125.

Gutiérrez, K. D. (2008). Developing a sociocritical literacy in the third space. *Reading Research Quarterly, 43*(2), 148–164.

Gutiérrez, K. D., Rymes, B., & Larson, J. (1995). Script, counterscript, and underlife in the classroom – Brown, James versus Brown v. Board of Education. *Harvard Educational Review, 65*, 445–471.

Gutiérrez, K., Baguedano-López, P., & Tejeda, C. (1999). Rethinking diversity: hybridity and hybrid language practices in the third space. *Mind, Culture, and Activity, 6*(4), 286–303.

Hodkinson, P., Biesta, G., & James, D. (2007). Understanding learning culturally: overcoming the dualism between social and individual views of learning. *Vocations and Learning, 1*(1), 27–47.

Leont'ev, A. N. (1978). *Activity, consciousness, and personality.* Englewood Cliffs: Prentice-Hall.

Malloch, M., Cairns, L., Evans, K., & O'Connor, B. N. (Eds.). (2011). *The SAGE handbook of workplace learning*. Los Angeles: Sage.

Meyers, E. M. (2007). From activity to learning: using cultural historical activity theory to model school library programmes and practices. *Information Research*, *12*(3) paper 313. [Available at http://InformationR.net/ir/12-3/paper313.html]

Mukute, M. (2010). *Exploring and expanding learning processes in sustainable agriculture workplace contexts.* PhD thesis. Grahamstown, South Africa: Rhodes University.

Pihlaja, J. (2005). *Learning in and for production: An activity-theoretical study of the historical development of distributed systems of generalizing*. Helsinki: University of Helsinki, Department of Education.

Roth, W.-M., & Lee, Y.-J. (2007). Vygotsky's neglected legacy: cultural-historical activity theory. *Review of Educational Research, 77*(2), 186–232.

Rubtsov, V. V. (1991). *Learning in children: Organization and development of cooperative actions*. New York: Nova.

Sannino, A. (2010). Teachers' talk of experiencing: conflict, resistance and agency. *Teaching and Teacher Education, 26*, 838–844.

Sannino, A., Daniels, H., & Gutierrez, K. D. (Eds.). (2009). *Learning and expanding with activity theory.* Cambridge: Cambridge University Press.

Sawchuck, P. H. (2011). Researching workplace learning: An overview and critique. In M. Malloch, L. Cairns, K. Evans, & B. N. O'Connor (Eds.), *The SAGE handbook of workplace learning* (pp. 165–180). Los Angeles: Sage.

Schaupp, M. (2011). From function-based development practices to collaborative capability building: An intervention to extend practitioners' ideas. In R. F. Poell & M. van Woerkom (Eds.), *Supporting workplace learning: Towards evidence-based practice* (pp. 205–224). New York: Springer.

Spasser, M. (2002). Realist activity theory for digital library evaluation: conceptual framework and case study. *Computer Supported Cooperative Work, 11*, 81–110.

Toiviainen, H., & Engeström, Y. (2009). Expansive learning in and for work. In H. Daniels, H. Lauder, & J. Porter (Eds.), *Knowledge, values and educational policy* (pp. 95–109). London: Routledge.

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