

Chapter 3

The Change Laboratory in Theory



Abstract This methodological chapter gives the reader an overview on Cultural-Historical Activity Theory, the theoretical framework used in the study, with expansive learning, a learning theory specific for collectiveness, innovation and change of social practices. Formative interventions, especially the Change Laboratory workshops, are designed to trigger cycles of expansive learning and are based on two principles, ‘double stimulation’ and ‘ascending from the abstract to the concrete’. The interactions during Change Laboratory workshops can be recorded for later analysis, thus allowing the study of expansive learning as concept formation and development of collective transformative agency. This chapter also outlines how to organize and conduct a Change Laboratory within an organisation and the various tasks that can be used to promote expansive learning actions. While Cultural-Historical Activity Theory is broad, disputed and multifaceted, this chapter is based on the research of Engeström, Sannino and Virkkunen because they provide the theoretical foundation upon which to conduct an effective Change Laboratory.

Keywords Cultural-Historical Activity Theory · Expansive learning
Change Laboratory · Concept formation · Collective transformative agency

The chapter starts by introducing the three generations of Cultural-Historical Activity Theory (CHAT) from the Russian school of Vygotsky and Leon’tey, before moving to the contributions of more recent theorists such as Engeström. CHAT enlarges the focus of analysis to a collective activity system mediated by artefacts and oriented to an object. This activity system is studied in its network of relationships with the other connected activity systems for the purpose of studying expansive learning transformations for innovation and change of practices.

The second section presents formative interventions developed within the Vygotskian activist and interventionist legacy, which seeks to bring about cycles of expansive learning. It distinguishes between common variable-centred linear interventions from process-centred formative interventions useful to trigger expansive learning. The section also outlines the Change Laboratory, a type of formative intervention characterised by a highly mediated setting with writing surfaces used according to different levels of abstraction and to a historical perspective. The Change Laboratory

also features an interplay between distanced intellectual analysis and close emotional involvement, by utilising mirrors such as video-taped materials gathered on the field that are later used to trigger discussion.

The following sections show the basic principles that formative interventions are based on. The third section explains the principle of double stimulation, which is thought of as the foundation of human will and the gateway to higher psychological functions. Double stimulation allows the development of collective transformative agency, when the participants break away from the given frame of action to implement a new model. A dialectical view of development characterises expansive learning with a thinking that differs substantially from common patterns of thought, and the fourth section presents the principle of ascending from the abstract to the concrete, that is the dialectical process of constructing theoretical concepts. Theoretical generalisations aim to arrive at the internal relationships of objects and their historical development. The fifth section explains how to prepare a Change Laboratory, including negotiating the intervention with the representatives, carrying out field research, scheduling and preparing the workshops. The sixth section gives an idea about the forms of tasks needed to engage the participants in the diverse expansive learning actions, including historical analysis and actual empirical analysis useful to promote theoretical generalisations.

The aim of this chapter is not to make a literature review of Change Laboratory, nor to enrich the theory with personal reflections. The goal is rather to explain the concepts that are important to frame this research and show that the Change Laboratory is a rigorous although flexible model with strong theoretical underpinnings. The basis is the manual of Virkkunen and Newnham (2013) which the reader is forwarded to consult for more complete information. The scholarship that underpins this chapter includes the work of Engeström and Virkkunen, the two authors who designed the Change Laboratory. The work of Sannino will also be reviewed as it is pivotal in forming a definition of a collective transformative agency.

3.1 Expansive Learning

Cultural-Historical Activity Theory (CHAT) is a theoretical framework that helps study and understand the relations between the human mind, with what individuals feel and think, their activity, as well as what individuals do (Daniels, 2016). Its origins come from the cultural-historical school of the Russian psychology. According to CHAT, the interaction between humans and other humans or with the environment is not fixed or determined by biology, but is mediated by tools (Virkkunen & Newnham, 2013). Engeström (1987) identified three generations of Activity Theory. The first generation was pioneered by Vygotsky, who first described the concept of mediation as a triadic relationship between the stimulus, the response and a complex act mediated by artefacts (Vygotsky, 1978, in Engeström, 2015). The idea of mediation in human action was revolutionary as it transcended the dualistic relationship between the individual and the society (Engeström, 2015). Thus, while the individual had to

be considered in the light of his or her cultural means, the society had to be considered with regard to the individual who produces and make use of artefacts to interact with the world. With a switch from studying isolated elements to studying relationships, Vygotsky also redefined the scope of analysis to focus on units (Virkkunen & Newnham, 2013). A unit is the smallest combination of internal relations with a unity of opposites which still shows the dynamism and the qualities of the whole. The focus of the analysis, however, remained still centred on the individual (Engeström, 2015).

The second generation of CHAT was initiated by Leont’ev (1981, in Engeström, 2015) who thought of human activity as collective phenomenon oriented to an object. The activity is carried out by individuals through actions and operations. The main feature of an action is that it is consciously oriented to a goal in a specific time and place. Actions are made of and performed by means of routinised operations, which are carried out with automatic unconscious processes. The visualisation of human activity and its internal relationships with a triangular model has been proposed by Engeström (2015, p. 63). Figure 3.1 shows the triangular model of human activity.

Leont’ev also added the division of labour into the basic unit of analysis (Engeström, 2009). An activity can only be performed by breaking down jobs among the community members and appointing the diverse actions to the different participants. This definition implies rules coordinate interactions. Furthermore, for Leont’ev (1978, in Virkkunen & Newnham, 2013), the division of labour mediates between the social meaning of an activity and the meaning made by its members. While community members carry out short-lived and goal-oriented actions, activity system is enduring and object-oriented. Human motives cannot be traced in the individual’s biology and materialise in collective human activities during the appropriation, use

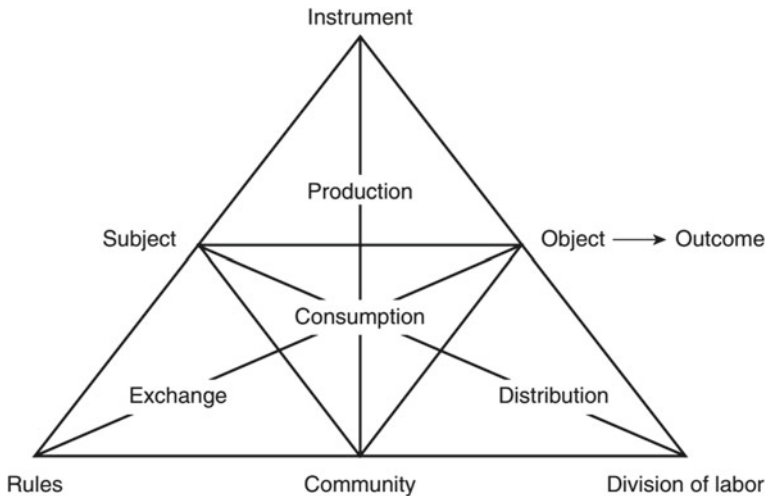


Fig. 3.1 Triangular model of human activity (Engeström, 2015, p. 63, reproduced with permission from Cambridge University Press)

and development of artefacts and objects (Miettinen, 2005). In an activity system, the object plays a key role, as it is the object which provides for the social meaning of the activity. The object, however, should not be confused with common definitions of ‘object’ or ‘objective’ (Virkkunen & Newnham, 2013). One example cited by Engeström (1990) is how a blacksmith makes use of the hammer to shape a chunk of iron. The blacksmith is the subject, the hammer is the instrument, and the piece of iron is the object. At one moment, the chunk of iron has no shape, but later it is a recognisable entity with a social meaning: the object is therefore contemporaneously given, projected and anticipated. This dual feature, abstract and concrete at the same time, shows the temporal and processual essence of objects, which crystallise and embody a historically accumulated collective experience. Furthermore, a shapeless mineral becomes the object of our action when we act on, perceive it, make hypotheses about it and imagine it. In doing so, the object becomes the motive and purpose of the action.

Starting from the 1980s, the third generation of CHAT has developed instruments to study networks of interacting activity systems, multiple perspectives and dialogue (Engeström, 2015). The focus is on communities seen as learners, creation and transformation of culture, hybridisation and horizontal movement and formation of theoretical concepts (Engeström & Sannino, 2010). In its present conceptualisation, CHAT can be summarised with the help of five principles (Engeström, 2000). The first principle is that the unit of analysis is a collective activity system mediated by artefacts and oriented to the object; an activity system of this type is considered in constantly evolving relationship with the other activity systems. The second tenet pertains to multi-voicedness; activity systems always embed a community with diverse points of view, interests and traditions due to the stories of individuals and their roles in the activity. The third principle contends that activity systems are born and transformed over long periods; consequently, their potentials and issues can be better grasped by taking an historical perspective. The fourth principle emphasises the role of contradictions as sources of development and change. Contradictions are different from simple conflicts or problems; they are historically accumulated structural tensions within and between activity systems. The fifth tenet suggests that there is always the possibility for expansive transformations. When the contradictions of an activity system become aggravated, some members start questioning and diverging from the established norms. They engage in a collective and purposeful effort to innovate and change. As a result, the practitioners achieve an expansive transformation when they succeed in reconceptualising the motive and the object of their activity so that there is a larger array of possibilities than in the previous activity system. Ideally, a cycle of expansive learning is composed of seven learning actions which logically follow from one another (Engeström, 2015), as displayed by Fig. 3.2.

The actions are (Engeström & Sannino, 2010; Virkkunen & Newnham, 2013):

1. To question, criticise or reject aspects of the current practices or present wisdom.
2. To analyse the situation with ‘why’ questions and explanations. The internal contradictions are found with a twofold analysis: an historical analysis of the changes occurred in the structure of the activity, and an actual empirical analysis

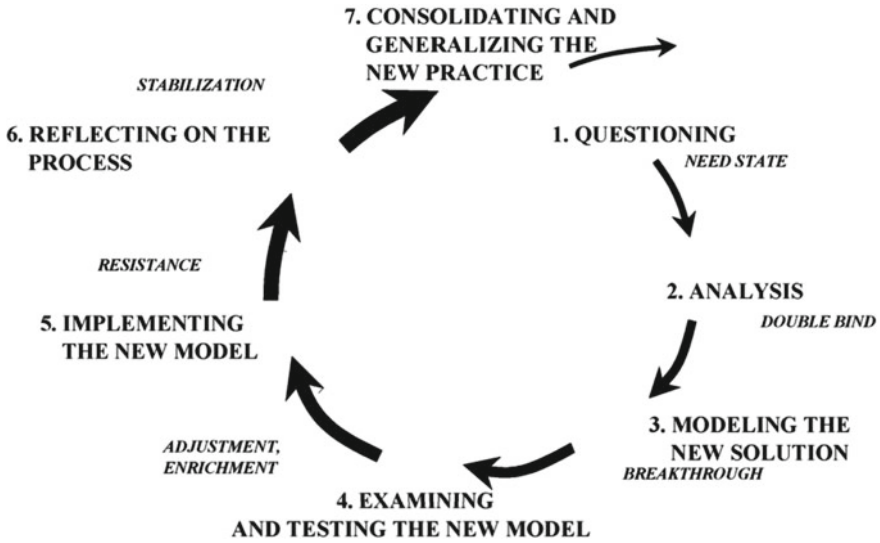


Fig. 3.2 Cycle of expansive learning (Engeström, 1999, p. 384). Reproduced with permission from Cambridge University Press

of the manifestations of contradictions in both daily practices and coordination among practitioners.

3. To model the new explanatory relationship in a way that can be observed and transmitted to the other members of the activity. This implies designing a germ cell, a simplified and explicit model of the novel idea.
4. To examine the new model and experiment it to evaluate its limitations, potentials and functioning.
5. To Implement the model in practice and enrich it.
6. To reflect on the model and evaluate the expansive learning process. The aim is to summarise the learning occurred during the process and look for further learning needs.
7. To consolidate the model into a stabilised practice and generalise it to other organisations or working units within the same organisation.

As stated by the fifth tenet above, contradictions play a significant role in expansive learning. In a market economy, each element of an activity (represented in Fig. 3.1) is part of two diverse systems of relationships that determine its features (Virkkunen & Newnham, 2013): (1) a specific function in the activity system, therefore connoting a use value; (2) a price in the market, therefore indicating an exchange value. This relationship between use value and exchange value causes a tension, yet each historical form of activity is a temporary way to manage such tension. The contrast between the two highlights the primary contradiction. The balance between use value and exchange value is strained when major changes occur in the elements and structure of the activity, or in the needs that the activity system fulfils, or in the

market. Such strain transforms primary contradictions into secondary contradictions between some of the activity system components, which leads to antithetical requests to the practitioners. A change in the object, for example, could call for doing something that would be impossible to achieve with the present rules or instruments. A reconfiguration of the object and re-equilibrated activity system would then lead to tertiary contradictions between the existing form and the new model of the activity system implemented. Eventually, quaternary contradictions emerge between the fully transformed activity system and the network of related activity systems it depends on.

It is rare that the internal contradictions of an activity system manifest themselves directly rather they are arrived at through an interplay of two types of analysis. These complementary analyses characterise the second expansive learning action of Fig. 3.2: the historical analysis considers the transformation of the activity structure, while the actual empirical analysis inquires about the actions that practitioners carry out every day (Virkkunen & Newnham, 2013). Contradictions can visibly manifest in deviations from scripts, waste in the process, ruptures, disturbances, conflicts and disagreements between individuals, but also practitioners' dilemmas, conflicts of motives, double binds. Table 3.1 outlines three key concepts related to contradictions: script, disturbance and rupture.

A large-scale cycle of expansive learning develops over years and solves the four types of contradictions towards a stable, radically new activity and system of relationships with the network of related activities. A large-scale cycle implies medium cycles, which are themselves formed by small cycles that could occur in a couple of hours. However, a small cycle could only be regarded as potentially expansive depending on the large-scale expansive transformation (Engeström, 2015). Expansive learning leads to a rediscovery of the activity: what the purpose is, what it is, who it serves. Such rediscovery is an empowering experience for the practitioners.

Schools have been often targeted by studies on expansive learning. Engeström (2009) suggests that studying learning environments as activity systems would help think the implementation of new technologies as an expansive learning process. While we consider technologies as universal and applicable in many settings, that is empirical generalisations, this interpretation tends to hide the cultural and historical specificity of the activity system where the technology is applied. Ignoring the speci-

Table 3.1 Terms related to contradictions

Script. Habitual, tacitly expected order of interacting participants' actions and the operations through which the actions are carried out

Disturbance. Negative deviation from the script or plan that puts the successful accomplishment of a collaborative work at risk

Rupture. When carrying out the script or plan or in the related communication, a rupture is a misunderstanding or failure to give or receive information that is pertinent to the process or to carry out a necessary action or operation. A rupture in communication often later leads to a disturbance

Source Virkkunen and Newnham (2013, p. 88)

ficities often results in problems, with practitioners resisting to the implementation. By contrast, if the activity system is taken as starting point “implementation no more appears a task of implanting an alien bubble in an unknown territory” (p. 25).

3.2 Formative Interventions

Activity Theory comes from a longstanding interventionist and activist tradition that scholars such as Vygotsky, Leont’ev and Luria (Sannino, 2011) developed during the historical turmoil of Russia. This tradition has resulted in formative interventions characterised by process-oriented research, which are radically different from linear interventions characterised by variable-based research (Engeström, 2011; Engeström & Sannino, 2010). Formative interventions differ from linear interventions in at least four ways. The first difference comes from the starting point; while in linear interventions the content and the goals are established before the beginning of the intervention, in formative interventions the practitioners deal with a contradictory and problematic object embedded in their activity, which they inspect and expand by building a new concept. The researcher discovers the content of such novel concept by helping the participants design it. The second difference comes from the process. In linear interventions, the learners are supposed to accept the contents and not to resist the researcher, and possible emerging issues and opposition are considered shortcomings of the design. In formative interventions, the contents and course development are continuously negotiated with the participants who progressively take the lead of the learning process. The third difference stems from the outcomes. In linear interventions, the aim is to fulfil a standardised module that will bring the expected outcomes; such module can be transferred to other environments and still result in the same outcomes. By way of contrast, the aim of formative interventions is twofold: constructing new concepts that may be challenged in other settings to design new appropriate solutions, and building agency among the learners by having them eventually leads the intervention. The fourth difference comes from the researcher’s role. While in linear interventions the researcher aims to gain control over the variables and the situation, in formative interventions he or she aims to provoke and sustain an expansive learning process which is guided and owned by the learners.

The Russian genetic modelling experiment, the French Clinic of Activity, the American Fifth Dimension and the Finnish Change Laboratory are all examples of formative interventions (Sannino, 2011). Concerning the history of the Change Laboratory, in the ‘80s Finnish researchers were starting to look for better ways to improve collective work practice than formative interventions (Virkkunen & Newnham, 2013). The first solution was Developmental Work Research (Engeström, 1996), which was applied to promote large cycles of expansive learning in organisations. These studies, however, tended to last for years, and there was a need for formative interventions that induced medium cycles of expansive learning within few months. The answer was the Change Laboratory, a model of workshop developed from the ‘90s at the Helsinki University to promote deep and intensive transformations as

well as incremental improvement (Engeström, Virkkunen, Helle, Pihlaja & Poikela, 1996). By triggering middle cycles of expansive learning, it helps perform a noteworthy advance in a wider and longer expansive transformation (Virkkunen & Newnham, 2013). The instruments of the Change Laboratory have been designed for theoretical thinking, for designing new systemic structures and for analysing the relationships within and between activities. A Change Laboratory is characterised by three dialectical movements (Engeström et al., 1996), with an interplay between abstraction and concreteness, an interplay between the different voices of participants and an interplay in time between the present, the past and the future. A Change Laboratory typically involves 15–20 practitioners’ workshops once a week for a couple of hours for ten workshops plus follow-up workshops. Figure 3.3 represents the structure of the Change Laboratory.

The main tool is a 3 × 3 set of writing surfaces (such as flip charts) to display work activity. The participants sit in front of the flip chart, and a scribe who they elect writes on the surfaces (Engeström et al., 1996). The horizontal dimension of the

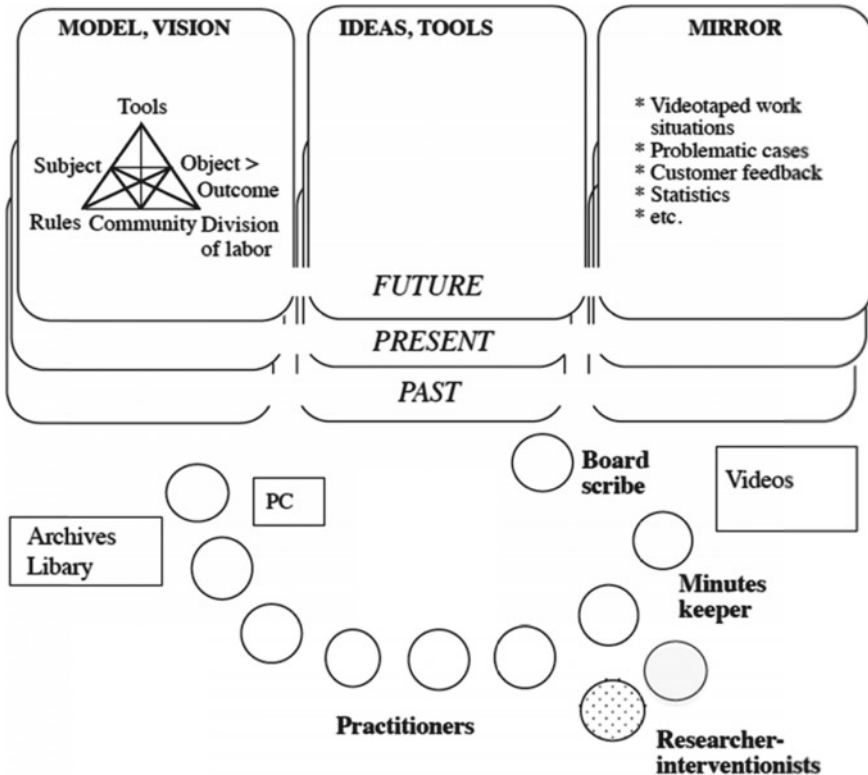


Fig. 3.3 Model of Change Laboratory (Virkkunen & Newnham, 2013, p. 16). Reproduced with permission from Sense Publishers

surfaces accounts for different levels of abstraction and generalisation. These are: model and vision; ideas and tools and mirror.

- At the lower level of abstraction, the mirror surfaces represent the experiences coming from the work practice with specimen or first-hand data. Mirror materials are useful for reflection; they can be problematic situation and disturbances, but also innovative solutions. Concerning their format, they can be videos, documents and figures of the work activity or interviews of customer feedback.
- At the highest level of theoretical generalization, there is a writing surface dedicated to conceptual analysis and theoretical instruments. The triangular model of activity (Engeström, 2015) and the cycle of expansive learning (Engeström, 1999) can be used to study the relationships and systemic quality of the activity system which is being analysed. This helps the participants trace the systemic roots of specific yet recurring disturbances and problems, thus identifying the type of contradiction affecting the activity system.
- In the middle, there is the writing surface for ideas and tools. While the participants move from concrete mirrors to theoretical models and visions, they produce intermediate partial solutions and ideas to be tested. Ideas and tools can be flowcharts schedules, diagrams and layout pictures of organisational structures, classification of interviews, formula to calculate costs, techniques for problem-solving and idea generation.

The vertical dimension of the writing surfaces represents the historical perspective which is important to understand potentials and limitations of an activity system. The three writing surfaces represent the past, the present and the future. Following the different steps of expansive learning illustrated in Fig. 3.2, a Change Laboratory could begin with the participants questioning (1) the present issues; by showing mirrors of the past, the problems could be analysed (2) to trace their roots. Next, the participants could model (3) the present activity and its internal contradiction, which helps concentrate on the main sources of problems. The participants could then conceive (3) a new structure of the future activity that tackles the contradiction with tools and partial solutions. Following, the group could examine (4) the new model to find the concrete following steps to be undertaken. In their daily activities, the participants would then implement (5) the new model and start experimenting with the new practices. These experiments would be video-taped and illustrated during the follow-up workshops as mirror of the future for collective reflection on the process (6) and progressively consolidate (7) the new model and practices.

The step-by-step implementation of the new model would be monitored and planned during the workshops. It is important to note that the new model conceived during this process would objectify the new idea in a way that can be seen and transmitted by all members of the organisation. Such representation could be material or graphic, but also a prototypic case, an observable specimen, or a form of action exemplifying the new principle. Only a part of the outcomes of a Change Laboratory can be observed after the end of the workshops, however, due to the design of this intervention. The Change Laboratory is intended to trigger a middle cycle of expansive learning with the generation of new concepts, while a full implementation in

a large-scale cycle would take more time and additional development. Beyond the generation of concepts, a Change Laboratory also improves the understanding of the contradictions of the activity system. Such increased awareness would be valuable for the participants to better deal with the primary, secondary, tertiary and quaternary contradictions that allow the full-scale expansive transformation of the activity system.

The next sections present double stimulation and ascension from the abstract to the concrete, the two basic and complementary principles expansive learning is based on. While double stimulation can be considered the energising principle for collective transformative agency, ascending from the abstract to the concrete is the generating principle for concept formation (Engeström & Sannino, 2016).

3.3 Expansive Learning as Collective Transformative Agency

Traditionally, cognitive theories have defined agency as a consequence of self-efficacy (Virkkunen, 2006). Agency was supposed to depend on the individual's beliefs on his or her ability to exert control over their circumstances. However, such a definition of agency rules out the mediating power those tools have on human behaviour. Sannino (2011) defines double stimulation as “the mechanism with which human beings can intentionally break out of a conflicting situation and change their circumstances or solve difficult problems” (p. 584). While double stimulation has long been considered a mere cognitive technique to improve concept formation and problem-solving, recent research suggests that it is also linked to motives, conflicts and agency (Engeström, Sannino & Virkkunen, 2014). Double stimulation is now considered the basic principle by which will materialises and the key process to investigate the higher psychological functions. It always includes conflictual aspects, in particular a conflict of motives, which constitutes a clash between opposite aspirations or tendencies which occur in situations involving uncertainty. This form of conflict is evident in subjects asking for the courage to make a deliberate choice: an action is volitional only when there are obstacles to carry it out. Together with the problematic situation, a conflict of motives represents the starting point with which individuals intentionally enact their behaviour and influence the world around them (Sannino, 2015).

Double stimulation was first designed by Vygotsky (1978), who in an experimental situation gave a task to a child beyond his actual abilities (the first stimulus) and placed a neutral artefact next to him (the second stimulus). Vygotsky often observed that the child would often draw such neutral artefact into the problematic situation and turn into a meaningful sign to solve the task. In other words, the second stimulus remediated the solution of the problem. An everyday and classic example of double stimulation is tying a knot as a reminder. The event to be recalled is the first stimulus, whereas the knot is the second stimulus, this is the neutral artefact turned

into a meaningful sign to solve the problem of reminding. However, double stimulation can be used to manage more complex and conflicting situations. For instance, Vygotsky (1997) referred to the waiting experiment (also named as the meaningless situation) to show the individual's ability to change his or her circumstances (Engeström & Sannino, 2016). This classic experiment has been repeated with variations by Sannino (2015, 2016). A person is invited to take part in an experiment, yet the experiment deals with leaving the individual into the room with no instructions nor tasks. Research has observed the subject's tendency to hesitate until he or she looks at the clock in the room and makes the decision to quit when the hands of the clock move to a position. In such a 'meaningless situation', the wait in the room is the first stimulus; as the time elapses, the wait gives rise to a conflict between possible decisions, whether to leave or remain. The clock becomes the second stimulus, and it is turned into a meaningful sign enhancing the person's will to break from the problematic situation.

The waiting experiment suggests that the individual dominates their behaviour by using external stimuli, the starting point being a conflict of motives. Vygotsky (1997, in Engeström & Sannino, 2016) argued that the only control the individual has over themselves is represented by the power that stimuli exert over their behaviour. By pointing out the initial neutrality of the second stimulus, Vygotsky implied that the outcome of the connection between an artefact and a problematic situation is a creative process of signification (Virkkunen & Newnham, 2013) and that the second stimulus cannot be strictly regulated externally by the researcher. Double stimulation is characterised as a remediation process, since the individual substitutes the previously internalised tool with a new (externalised?) one that is more useful to resolve the conflict of motives. Its phenomenology entails two steps: a design phase of constructing the mediating artefact, followed by an execution phase where the action is performed as if it was automatic (Engeström & Sannino, 2016; Sannino & Laitinen, 2015).

Even though Vygotsky studied double stimulation at the individual level, it should be remembered that for him the higher psychological functions first appear in collaborative action, and only later they are internalised by the individual (Engeström, 2011). In other words, double stimulation can be used by groups and transferred to the Change Laboratory to remediate the aggravated contradictions affecting an activity system. The first stimuli are the mirror materials, the representation of important problems in work practices that the participants are confronted with. As second stimuli, the researcher introduces tools such as the triangular model of activity (Engeström, 2015) and the cycle of expansive learning (Engeström, 1999) to promote a deeper understanding of the intrinsic relationships and the historical development of the activity. Such second stimuli are later combined or replaced with other models and concepts generated by the participants (Engeström, 2011). In other words, the participants use the second stimuli given by the researcher as signs to actively design their own new concept. Both the first and second stimulus typically undergo multiple formulations during the Change Laboratory, which become particularly evident in the construction of the second stimulus, as it involves an ambiguous and incomplete artefact that is progressively filled with meaning and contents.

In the Change Laboratory, the principle of double stimulation is key to build practitioners' will to transform their activity system (Virkkunen, 2006). While the power to bring about change in organisations has been traditionally reserved to the management, during the Change Laboratory, double stimulation causes practitioners to develop collective transformative agency. This behaviour is defined as "breaking away from the given frame of action and take the initiative to transform it" (Virkkunen, 2006, p. 49). Groups express collective transformative agency when they search collaboratively for a new model and new practices. Such agency is transformative because it is triggered by the analysis of the contradictions concerning the activity (Haapasaari, Engeström & Kerosuo, 2014). Rather than concerning here-and-now interactions, it deals with a protracted engagement, a vision and a model to be implemented. Engeström (2011) and Haapasaari et al. (2014) identified six expressions of transformative agency within the Change Laboratory.

1. Resisting the management or the interventionist. This could be expressed as rejection, opposition, questioning.
2. Criticising the existing activity system.
3. Explicating novel potentials or possibilities in the activity. This action could be expressed by speaking of unexploited positive experiences happened in the past or by pointing out that the challenges pertaining to the object could lead to new opportunities.
4. Envisioning new models or pattern of the activity. This form of expression could span from simple suggestions to working on new models of the activity.
5. Committing to concrete change. This resolution is expressed in form of speech acts.
6. Acting to change the activity. The change actions are carried out between the workshops.

Furthermore, transformative agency tends to evolve throughout a Change Laboratory, with a shift from resistance and critiques towards commitment and concrete actions (Haapasaari et al., 2014). Another shift that can be observed throughout the workshops is from individual initiatives to collective forms of agency. Sannino (2010) suggests that the practitioners' personal conflicts of motives are often related to the contradictions of the activity systems they are part of. This means that a conflict of motives often has a systemic basis rather than a personal one. Participants could therefore move beyond resistance by internalising effective second stimuli and exteriorising their internal conflicts.

Relation agency is another concept complementary to a collective transformative agency. A relational agency develops in a process made of two stages that are in a continuous dynamic consisting of (Edwards, 2011):

- (1) Cooperating with others to expand the task or the object of activity that is worked on. This is achieved by acknowledging the resources and motives that others carry as they interpret the object of activity.
- (2) Regulating one's own replies to the newly enriched interpretations, through the responses that have been made by the others while working on the expanded object.

3.4 Expansive Learning as Concept Formation

The second characterising principle of expansive learning is ascending from the abstract to the concrete, a process which paves the way for collective concept formation. It was Vygotsky (1987) who first conceptualised a two-ways movement between scientific concepts located at the highest level in the development of thinking and everyday concepts placed at the bottom (Sannino, Engeström & Lemos, 2016). While the verbal definition of a scientific concept at the top descends to the concrete as part of an organised system, the everyday concept moves upwards with generalisation and abstraction (Engeström & Sannino, 2016). Again, Vygotsky only considered concepts at the individual level with a ‘vertical’ dimension, that is from the abstract-concrete dialectic. In doing so, he ruled out the ‘horizontal’ collective dimension of concept formation, with different individuals having different perspectives (Engeström, 2015).

Engeström, Pasanen, Toiviainen and Haavisto (2006) suggest that concepts represent not only practical tools to master and handle objects, but also visions oriented to the future and ways to create worlds. While the cognitive theories have dealt with concepts as neutral, well-defined and stable entities, Engeström et al. (2006) argued that concepts are characterised by four properties. Firstly, complex concepts are tools and outcomes used by activity systems that evolve historically. Rather than being considered as textual or logical propositions, they should be investigated as embedded in human activity. Second, complex concepts are intrinsically dynamic, debated and polyvalent. Diverse stakeholders tend to generate somewhat conflicting versions, and their formulation involves different perspectives with contestation and confrontation. Third, concepts are oriented to the future; they embed collective intentions, visions, affects, hopes and fears. Fourth, concepts are best learned when they are implemented, reconstructed and challenged in the practitioners’ daily activities. For Virkkunen and Newnham (2013), concepts are crystallisations of knowledge and more culturally evolved generalisations. These authors, furthermore, link concepts with the types of variations tested in human practice that are valuable in human activities.

Furthermore, different types of thinking generate different concepts and generalizations. In this regard, expansive learning is characterised by a dialectical view of development with a type of thinking that differs substantially from common thinking (Virkkunen & Newnham, 2013). In everyday thinking, objects have specific qualities and are dealt with as they were isolated and fixed entities, thus ignoring the chain of events which led to their emergence and existence. Everyday thinking also tends to ignore the intrinsic dynamicity and development of objects. In a dialectical view of development, the potential to overcome contradictions plays a fundamental role, and the relationships between phenomena and objects can only be found by studying their historical development and by experimenting on them. Discovering the essential functional relationships of theoretical concepts makes it possible to reveal possibilities that have not yet been accomplished.

It was Davidov (1990, in Engeström & Sannino, 2016) who first studied concepts by distinguishing between empirical and theoretical generalisations. Empirical generalisations are based on everyday thinking, while theoretical generalisations are based on a dialectical view of development (Virkkunen & Newnham, 2013). In empirical generalisations, objects and phenomena are compared to look for identical qualities and parts, and they are categorised according to their external resemblances. By contrast, theoretical generalisations seek to understand how different parts are functionally related and how they complement each other to produce an operating totality, a unit with new properties that belong to none of its parts. Such unit embeds the smallest combination of inner relations and unity of opposites that still preserves the features of the whole. The Change Laboratory makes use of both these complementary types of generalisations. The basic unit of analysis is the activity system, including a theoretical generalisation about its dynamics, inner structure, history and protracted transformation.

Davidov's (1990) principle of ascending from the abstract to the concrete concerns the dialectical process of constructing theoretical generalisations (in Engeström & Sannino, 2016). It is arrived through a collective analysis of how the inner contradictions emerged and how they have been tackled (Virkkunen & Newnham, 2013). A theoretical concept is first conceived as an abstract and basic explanatory relationship named 'germ cell', which is progressively endowed with meaning and details to form a system of concrete manifestations, that is a set of practices. In doing so, the germ cell becomes a fully developed theoretical concept. A Change Laboratory can start the process of generating a 'germ cell' and enrich it with concrete manifestations. The complete process of ascending from a 'germ cell' to a complete and operational theoretical concept, however, would only be achieved within an entire large cycle of expansive learning.

3.5 Preparing a Change Laboratory

A trained researcher is necessary for preparing and conducting a Change Laboratory. There are two aspects to be considered to start with (Virkkunen & Newnham, 2013):

- The involvement of the organisation's representatives to negotiate the aim of the intervention and a mandate for performing it. A project outline is generally agreed on, and this is a first step to identify troubles and challenges that need analysis and novel solutions. The project outline also connects the Change Laboratory with the structure and practices of the organisation and pinpoints the goals and overall structure of the intervention. During this phase of negotiation, the researcher starts to define the activity system with its internal relationships and tries to make hypothesis on the object and the societal need behind it. Some of the areas of investigation concern the major changes that occurred, client dissatisfaction, current initiatives regarding the development of the activity, management's views of the present situation, as well as the units where change has been most pronounced.

- The schedule of the workshops and the data collection on the field. The challenge is planning both the overall agenda and the coming workshop. As part of the second workshop, the researcher analyses the previous workshop and considers the outcomes of the present workshop in planning those that follow.

Second, when selecting the pilot unit for the intervention, the researcher should look for a group that not only has a problem to solve and therefore is committed to change, but is also stable enough to sustain the intervention in the medium term. Moreover, the unit should be chosen so as to possibly represent a prototype to be spread across the organisation at a later stage (Virkkunen & Newnham, 2013). The main criterion to select the participants is their belonging to the organisation (that is the activity system) that will be analysed during the Change Laboratory. For example, in a school, a course or a class can be considered an activity system, therefore the teachers attending the workshops should belong to the same course or class rather than being selected according to the subject they teach. The best number of participants in a Change Laboratory is 15–20 individuals to leave each the possibility to express themselves during the workshops. To be effective, an intervention should also be intensive and uninterrupted; the number of workshop is generally decided before its beginning and varies from five to twelve intensive two-hours workshops on weekly basis. The time between the workshops is necessary for reflection and for carrying out tasks related to the specific expansive learning action being solicited. A period of 4–6 weeks of experimenting with the new practices follows, after which the participants meet for follow-up workshops. Moreover, the effectiveness of the outcomes of the Change Laboratory is significantly improved when they are linked to the management's strategic vision of the activity (Virkkunen & Newnham, 2013). A steering group could help the research guiding the intervention process. While the participants in the Change Laboratory discuss the issues they encounter with no external interference, it is important that the management and the other stakeholders are acquainted with the progress.

Third, the researcher's participant observation is necessary before the beginning of the intervention as well as in between the workshops. Data collection has the aim of helping the researcher to understand the activity system and triggering collective reflection and discussion during the workshops (Virkkunen & Newnham, 2013). Such data is called a 'mirror'. The researcher gathers information to record the customary practices and the emerging phenomena that destabilise the present practices and could lead to their questioning. The key criterion for data gathering is a focus on the relationships rather than on isolated elements of the organisation, including the personal perspectives of the actors. A 'mirror' of clients, for example, could be built by first identifying the composition and the variation of different types, then by choosing most problematic examples or new types. During the workshops, the researcher could discuss the differences between the new and old type of clients and draft a model with the main types of historical change of the object. Other materials that could function as 'mirror' could be the trajectory of cases taken as examples of the new problematic objects and the key actions in the activity. Mirror materials are most effective in triggering discussion when presented as video recorded

clips. The suggested methods for data collection are: scheduled interviews with managers, practitioners and clients, observation and videotaping of practices and actions, analysis of documents and practitioners' disturbance diary. The quality of 'mirror' improves when a combination of these methods are used concurrently with one another.

Fourth, during a Change Laboratory, the expansive learning process is divided into actions, and therefore the tasks are planned before the workshops with the aim of promoting specific learning actions (Virkkunen & Newnham, 2013). The challenge is to have the group performing the planned tasks in the limited time available without rushing or hampering the ongoing discussion and problem-solving process. Deviations from the researcher's plan are expression of collective transformative agency, and therefore the researcher promotes and backs them during the workshops with double stimulation. The intention is not to directly target the solution, but rather to turn initial troubles into secondary troubles. Moreover, through a chain of double stimuli, the participants should arrive at the solution of the primary problem with the new model.

The following elements can be considered when designing a task based on double stimulation (Virkkunen & Newnham, 2013):

- A mirror material on the activity to be watched by the participants.
- A question or an assignment based on that 'mirror' is employed to solicit reflection and discussion. This strategy stimulates the construction of the problem namely the first stimulus.
- A method or tool for analysis used as second stimulus to tackle the problem.
- How the learning action is performed, in subgroups, individually or by the entire group.
- The way participants will document the results of the learning action.
- How to discuss, make inference and record the results.

For example, during a Change Laboratory in a school, the researcher could present a video of a lesson (the 'mirror') and ask the teachers to analyse what message about the present practices this tells. Following, the researcher could explain the concepts of disturbance and rupture (see Table 3.1) to help the participants perform the analyses and suggest that they look for ruptures and disturbances in the 'mirror'. This work could be carried out in parallel by the teachers being divided into three subgroups, the outcomes being written on a flip chart and later shared with the entire group. Next, the participants could discuss which of the identified ruptures and disturbances are meaningful, recurring and typical, before writing them on the flipchart for ideas/tools in the present. In this way, defensive attitudes can be overcome with a multi-voiced discussion.

Fifth, the role of the researcher would be to promote collective thinking via an interplay of observations, views and suggestions. The first step is to turn the intellectual motivation to develop the activity into an effective motive, with involvement and interest in taking part in the workshops (Virkkunen, 2006). The participants coming to the first workshop may be already motivated to transform their activity system, but they often see problems from an individual perspective. Consequently, they have

diverse ideas on what are the most important issues and how to tackle them. For the researcher, the challenge is to turn these initial troubles and partial motivations into effective motives to bring about change. The effective motive for scrutinising and improving the activity system comes from the acknowledgment that only with a collective action can new opportunities, problems and disturbances be tackled. To do so, the researcher creates an interplay between distanced intellectual analysis and close emotional involvement. While the former—when used in isolation—leads to speculations and hypothetical talk detached from the practitioners' action and motives. In contrast, when the second is used by itself, it leads to moralisation and blaming the individual. This process can be worked towards in four steps (Virkkunen & Newnham, 2013):

- (a) Soliciting and clarifying the observations, perspectives and suggestions of the participants (“What do you see in the mirror?”, “What do you think about this?”, “What do others believe?”).
- (b) Discussing differences and oppositions between ideas (“What are the differences here?”, “Would this be compatible with the idea made by X?”, “Where does such idea come from?”).
- (c) Pointing out that there are two opposite ideas that can be overcome with an expansive solution. Based on the Hegelian dialectical method that connects thesis, antithesis to produce synthesis, the researcher encourages the participants to clarify the contradiction between perspectives and carry on the concrete analysis. The aim is to contrast people's tendency to escape from conflicts, which is generally done by avoiding questioning and moving to abstract conversations.
- (d) Asking the participants to look at the opposition more broadly in its context and find means to mediate the contradiction in perspectives. To educate, the participants think with dialectical movements, while the researcher's role is to offer other ideas or viewpoints.

3.6 Designing Tasks to Promote Expansive Learning

This section explains how to plan tasks to promote specific expansive actions (Virkkunen & Newnham, 2013).

1. Questioning. This expansive learning action deals with rejecting and criticising some parts of common plans, practices or wisdom. Rather than distanced rational critique, this expansive learning action entails close emotional involvement. This is done in three steps:
 - (a) The trigger is whoever emphasising something that contradicts the current practice, the predominant thinking or common wisdom.
 - (b) This brings about discussion and upset among the participants, who could try to restore their internal equilibrium by neutralising the observation with myths or by blaming the individual.

- (c) The emotional involvement is transformed by the researcher into a willingness for a detached intellectual analysis. This is achieved by directing the discussion towards the systemic causes of the problematic issues and by underlining the role of tools and other elements of the activity system in causing the negative situation.

The questioning tasks are triggered by mirror materials based on the key and recurrent troubles of the collective activity. This expansive learning action does not generally need second stimuli, and most of the times it is enough to proceed with questions such as “Do you think there is an issue here?”, “What do you think it is?”, “What makes you say that?”. The material should be discussed in depth, and all participants should have the possibility to express their perspective.

2. Analysing. The following expansive learning action is to wonder about the causes and conditions that led to the questioned facets dealt in the previous learning action. The causes are searched for with a twofold analysis: (a) an actual empirical inquiry of the present practice where the trouble is placed in the context of the whole activity; (b) an historical inquiry of the evolution of the object and format of the activity, leading to the recognition of its internal contradictions. The two types of analysis support each other; the actual empirical inquiry gives an overview and hypothesis of the primary contradiction, thus supporting the historical inquiry in the scrutiny of the present situation. The goal is to reduce the diverse troubles at the surface level of actions to a succinct representation of the core causes, that is the main contradiction affecting the activity.
 - Historical analysis. This practice is initiated by a historical mirror of the collective activity. The analysis concerns change events that occurred in the object and in other parts and of the activity system, thus causing a transformation of the activity. In order for this inquiry to be precise and reliable, it is important to collect documents so to avoid relying only on the participants’ memories. The meaningful changes which eventuated throughout the history of the activity can be sequenced with the help of a timeline. Following this step, a grid can be used to visualise the changes which took place, so to find qualitatively different periods in the history of the activity. One axis of the grid would represent the timeline of recent activities, while the other axis demonstrates the changes that came about. For this analysis to be based on facts rather than abstractions, it is important that the object and elements of the activity system are detailed with examples coming from the practice.
 - Actual empirical analysis. During the analysis of the present practices, the participants summarise the causes of the disturbances and ruptures they meet in daily activities. They also think of novel solutions and emerging new practices that could lead to an expansive advancement of the collective activity. The goal is to identify as clearly as possible the main contradiction; this can be done in form of diagram, for example, a Cartesian coordinate system with two axes dividing a space in four areas or by using the triangular model of human activity (Engeström, 2015).

3. **Modelling.** In this expansive learning action, the participants look for a process or an object that contains both sides of the primary contradiction and can thus help evaluate how best to address it. Theoretical concepts, available examples and existing models can be helpful in the search for the new model. Such search tends to generate several competing proposals that should be compared against each other to serve as second stimuli and help model the new solution. The development of a new model requires a reconfiguration of the object and the elements of the activity, as well as their relationships, leading to the emergence of secondary contradictions. The model will be the second stimulus leading the concrete experimentation of the new practice.
4. **Examining and testing.** This expansive learning action often interacts with the previous one in a continuous improvement of the model and its implementation. In this learning action, the participants carry out thought experiments and focus on how the new model is able to be practically implemented. They try to anticipate matters that could hinder or support change. The researcher encourages the participants to think of contexts that could act as tests for the new model and situations where the difference between the new and the old could be apparent. The practitioners who did yet not participate in the Change Laboratory are involved to support the change effort.
5. **Implementing.** At this stage, the lead of the expansive learning process has passed from the researcher to the participants. The practical implementation should not be a separate one-time change, but the initial move to overcome the identified main contradiction. Some participants take the responsibility for the implementation and obtain the necessary support from the management. Many practical issues concerning the implementation are dealt with, thus enriching the model, and tertiary contradictions could emerge between the old and the new practices. The researcher videos the planned experiments and presents the videos as mirror material during the follow-up workshops to secure further reflection on the model.
6. **Reflecting.** This expansive learning action helps the expansive transformation of the activity and its stabilisation. The researcher helps the process by: defining the type of mirror material need, gathering data for reflection, defining the tasks for reflection on the model and preparing the conceptual instruments for reflection. Central issues to be discussed concern the awareness on the key contradictions and how they were overcome, new visible possibilities and problems and actions needed to promote further progress in the activity. Reflection also concerns the circumstances that favoured or impeded expansive learning in the expansive learning actions. At this stage, quaternary contradictions could emerge between the main system and the interconnected activity systems.
7. **Consolidating and generalising.** This expansive learning action not only concerns the organisational decisions regarding the implementation, the rules and the tools, but also the crystallisation of the new concept and terminology. A document summarising the new model could support this expansive learning action, and by approving this document, the management would pave the way for the implementation of the new model. The document also informs and guides the

practitioners who have not participated in the workshops. Rather than ‘freezing’ the new practice, consolidation entails a dynamic and sustainable approach, with an endless evolution of the activity while making it the customary way to act. The role of the management is key here to determine that the positive outcomes of a Change Laboratory remain in the local unit, else they vanish. In this regard, when the researcher leaves, a tension arises between the need for continuous development and the inadequacy of means.

In conclusion, this theoretical chapter has shown the main concepts useful for understanding the field research that is presented in the next chapters: activity system, cycle of expansive learning, object, contradictions. Since this study focuses on teachers that want to change their circumstances, a collective transformative agency is important to understand how a sense of initiative and entrepreneurship is developed. The following chapter will tell the Change Laboratory on the field, with a vivid description of the workshops and tasks designed to trigger the expansive learning actions that have been described here.

Bibliography

- Daniels, H. (2016). *Vygotsky and pedagogy*. New York, NY: Routledge.
- Davidov, V. V. (1990). *Types of generalisation in instruction: Logical and psychological problems in the structuring of school curricula*. Reston, VA: National Council of Teachers of Mathematics.
- Edwards, A. (2011). Building common knowledge at the boundaries between professional practices: Relational agency and relational expertise in systems of distributed expertise. *International Journal of Educational Research*, 50(1), 33–39.
- Engeström, Y. (1987). *Learning by expanding: An activity theoretic approach to developmental research*. Helsinki: Orienta-Konsultit.
- Engeström, Y. (1990). *Learning, working and imagining. Twelve studies in activity theory*. Helsinki: Orientakonsultit.
- Engeström, Y. (1996). Developmental work research as educational research: Looking ten years back and into the zone of proximal development. *Nordisk Pedagogik*, 16(3), 131–143.
- Engeström, Y. (1999). Innovative learning in work teams: Analyzing cycles of knowledge creation in practice. In Y. Engeström, R. Miettinen, & R.-L. Punamäki (Eds.), *Perspectives on activity theory*. Cambridge University Press.
- Engeström, Y. (2000). Activity theory as a framework for analyzing and redesigning work. *Ergonomics*, 43(7), 960–974.
- Engeström, Y. (2009). From learning environments and implementation to activity systems and expansive learning.
- Engeström, Y. (2011). From design experiments to formative interventions. *Theory & Psychology*, 21(5), 598–628.
- Engeström, Y. (2015). *Learning by expanding*. Cambridge University Press.
- Engeström, Y., Pasanen, A., Toiviainen, H., & Haavisto, V. (2006). Expansive learning as collaborative concept formation at work. In K. Yamazumi, Y. Engeström, & H. Daniels (Eds.), *New learning challenges: Going beyond the industrial age system of school and work* (pp. 47–77). Osaka: Kansai University Press.
- 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. (2016). Expansive learning on the move: Insights from ongoing research/El aprendizaje expansivo en movimiento: aportaciones de la investigación en curso. *Infancia y Aprendizaje*, 39(3), 401–435.
- Engeström, Y., Sannino, A., & Virkkunen, J. (2014). On the methodological demands of formative interventions. *Mind, Culture & Activity*, 21(2), 118.
- Engeström, Y., Virkkunen, J., Helle, M., Pihlaja, J., & Poikela, R. (1996). The change laboratory as a tool for transforming work. *Lifelong Learning in Europe*, 1(2), 10–17.
- Haapasaari, A., Engeström, Y., & Kerosuo, H. (2014). The emergence of learners' transformative agency in a Change Laboratory intervention. *Journal of Education and Work*, 29(2), 232–262.
- Leont'ev, A. N. (1981). *Problems of the development of the mind*. Moscow: Progress.
- Leont'ev, A. N. (1978). *Activity, consciousness, and personality*. Englewood Cliffs, NJ: Prentice-Hall.
- Miettinen, R. (2005). Object of activity and individual motivation. *Mind, Culture, and Activity*, 12(1), 52–69.
- Sannino, A. (2010). Teachers' talk of experiencing: Conflict, resistance and agency. *Teaching and Teacher Education*, 26(4), 838–844.
- Sannino, A. (2011). Activity theory as an activist and interventionist theory. *Theory & Psychology*, 21(5), 571–597.
- Sannino, A. (2015). The principle of double stimulation: A path to volitional action. *Learning, Culture and Social Interaction*, 6, 1–15.
- Sannino, A. (2016). Double stimulation in the waiting experiment with collectives: Testing a Vygotskian model of the emergence of volitional action. *Integrative Psychological and Behavioral Science*, 50(1), 142–173.
- Sannino, A., Engeström, Y., & Lemos, M. (2016). Formative interventions for expansive learning and transformative agency. *Journal of the Learning Sciences*, 25(4), 599–633.
- Sannino, A., & Laitinen, A. (2015). Double stimulation in the waiting experiment: Testing a Vygotskian model of the emergence of volitional action. *Learning, Culture and Social Interaction*, 4, 4–18.
- Virkkunen, J. (2006). Dilemmas in building shared transformative agency. *Activités*, 3(3-1).
- Virkkunen, J., & Newnham, D. S. (2013). *The Change Laboratory. A tool for collaborative development of work and education*. Rotterdam: Sense Publishers.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge: Harvard University Press.
- Vygotsky, L. S. (1987). *Thinking and speech. The collected works of LS Vygotsky, vol. 1*. In: New York: Plenum.
- Vygotsky, L. S. (1997). The history of development of higher mental functions. Chapter 12: Self control. In A. S. Carton & R. W. Rieber (Eds.), *The collected works of L. S. Vygotsky. Vol 4. The history of development of higher mental functions* (pp. 207–219). New York, NY: Plenum.

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