The best way to conduct intervention research: methodological considerations

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Abstract This article is a theoretical contribution to the debate about which qualitative Intervention methodology is best suited to building stronger partnerships between researchers and practitioners in educational research. In the first part of this article, two types of intervention methodologies gaining impact in the field are contrasted in light of Yrjö Engeström's criticism. This discussion lays the groundwork for the main claim in the second part of this article that dialogical work between researchers and practitioners focusing on 'contradictions' and the 'object of activity,' can provide analytical tools to improve understanding of challenges in intervention research.

Abbreviations

EDR Educational design research

CHAT Cultural–historical activity theory

1 Introduction

The change laboratory (Change Labs), developed by Engeström and his colleagues, and

the broader concept of educational design research (EDR) are both intervention methodologies

with the potential to bridge the gap between educational research and educational practice, and to promote stronger partnerships between educational researchers and professionals working in educational institutions. However, leading EDR researchers and Change Lab researchers rarely quote each other or contrast findings when reporting their numerous intervention projects in educational institutions. To the untrained eye, this fact may appear peculiar because of the apparent similarities in the aims and motives of EDR and Change Labs. Hence, for the interventionist researcher there is a need to understand the methodological differences between the two approaches when working closely with practitioners in developing new educational designs. On a personal level, this became obvious when I recently participated as one of the intervention researchers in a school development project. Choosing the most suitable intervention methodology was an important challenge right from the start. To address this challenge, I began by reviewing recent methodology literature on EDR (Plomp and Nieveen 2010; Akker et al. 2006; Akkerman et al. 2011; Kelly et al. 2008) as well as Engeström's criticism of it (Engeström 2007, 2009, 2011; Engeström and Sannino 2010). The outcome of this work led to the twofold purpose of this article. First, I review Engeström's criticism of EDR with an emphasis on the concept of double stimulation and his differentiation between formative and linear interventions. Second, as an extension of Engeström's criticism, I discuss how the concepts of *contradictions* and *object of activity* can illustrate challenges and complexity faced by intervention researchers. The second part is a response and supplement to a recent paper in this journal by Akkerman et al. (2011) in which they address complexity in EDR. In this connection, it is worth mentioning that the EDR community has not been engaged in criticizing the methodology of Change Labs to the same extent as Change Labs' criticism of EDR methodology.

2 Engeström's criticism of EDR

There is a need to clarify the messy and unsystematic use of concepts in intervention methodology. Change Labs and developmental work research (DWR) are concepts referring to both

the formative intervention method used by Engeström and his colleagues and to cultural–

historical activity theory (CHAT). The terms "design research," "design-based research,"

"educational design research," and "design experiments" all overlap in the research literature.

In an attempt to reduce confusion in this article, I use "Change Labs" when referring

to the methodology advocated by the Engeström "school," and "EDR" when referring to the

type of design and intervention methodology criticized by Engeström, which is contrasted

with the underlying principles of Change Labs. However, both Change Labs and EDR belong

to a family of approaches sharing the same features of open analytical frameworks intended to

link theory and practice and develop theory based on empirical data from intervention studies.

A key concept in EDR and Change Labs is *change*. Both methodologies share the objective

of conducting interventions and experimentations in institutions and work-based settings

founded on theoretical standards, and thereby revise and develop theory through an iterative

process of projection and reflection:

> *Design experiments* were developed as a way to carry out formative research to test and
>
> refine educational designs based on theoretical principles derived from prior research.
>
> This approach of progressive refinement in design involves putting a first version of a
>
> design into the world to see how it works. Then, the design is constantly revised based
>
> on experience, until all the bugs are worked out. (Collins et al. 2004, p. 18)

> *The Change Laboratory* method develops work practices by the participants in dialogue
>
> and debate among themselves, with their management, with their clients, and—not least–
>
> with the interventionist researchers. It facilitates both intensive, deep transformations
>
> and continual incremental improvement. The idea is to arrange, on the shop
>
> floor, a room or space in which there is a rich set of representational tools available
>
> for analysis of disturbances and for constructing new models of the work activity.
>
> (Engeström 2007, p. 370)

Both approaches emphasize the use of theoretical principles deriving from prior research in the transformation process of a design, referred to as 'tools' in Change Labs. Despite this central shared feature, we can clearly see a difference in the way participants are included in the iterative process of constructing new design. Change Labs puts dialogue among the participants as the driving force of developing new practices, while EDR emphasizes revision of prior designs without stressing the role of participants. This difference is foundational in Engeström's criticism and is rooted in the concept of double stimulation as a methodological basis of Change Labs.

2.1 Double stimulation

As mentioned above, participant involvement in the process of transforming educational design is a key difference between Change Labs and EDR. In Change Labs, double stimulation is viewed as a powerful pedagogical tool aimed at developing *expansive agency* in participants:

> I argue that double stimulation is radically different from such intervention approaches as the *design experiments* currently discussed in educational research. Double stimulation is, above all, aimed at eliciting new, expansive forms of agency in subjects. In other words, double stimulation is focused on making subjects masters of their own lives. (Engeström 2007, p. 363)

The method of double stimulation has its roots in the work of the early twentieth-century Russian psychologists Vygotsky, Luria, and Leontiev. As described by Vygotsky (1978), double stimulation is a method of capturing dialectical and higher psychological processes of developmental learning in the subject. A double stimulation experiment, in the Vygotskian sense, typically starts with placing a subject (e.g., a pupil) in a structured setting and confronting him/her with a problem beyond the pupil's present capacities. Neutral stimulus,

in the form of objects (e.g., pictures, geometrical figures, instruction manuals), and in most cases in the form of guidance by a tutor or collaboration with other pupils, is available for the learner. The role of the educational researcher in a double stimulation experiment is to study the subject's adoption and use of available stimuli (social and material recourses) in a problem-solving situation. In cases where a stimulus is actively used in the effort to solve the problem, it is a sign mediating the development of concept formation, which in turn may lead to the discovery of a solution to the problem. In the double stimulation method, the original problem-object is the first stimulus, whereas the available psychological, social, and material tools become second stimulus-means. The original method of double stimulation poses a challenge to any educational researcher who wants to control the outcome of an experiment. Engeström cites Veer and Valsiner (1991) to explain this challenge:

> The notion of experimental method is set up by Vygotsky in a methodological framework where the traditional norm of the experimenter's maximum control over what happens in the experiment is a special case rather than the modal case. The human subject always "imports" a set of stimulus-means (psychological instruments) into an experimental setting. These stimulus-means are in the form of signs that the experimenter cannot control externally in any rigid way. Hence, the experimental setting becomes a context of investigation where the experimenter can manipulate the structure of the investigation in order to trigger (but not "produce") the subject's construction of new psychological phenomena. (Veer and Valsiner, cited in Engeström 2007, p. 365)

As we see from the quote, the original method of double stimulation provides no tools to control externally what kind of stimulus-means the subject imports into the experiment. In a collective learning process, external control becomes even more complex. Thus, to better capture the subjects' cognitive construction and use of signs in a collective and social learning process, Engeström and his colleagues further developed Vygotsky's more general notions of

culturally mediated intentionality in the methodology of Change Labs. One way they did this was by including Leont'ev (1978) theory of the social origin of social action and collective intentionality, making it possible to investigate the social origin of various stimulus-means imported into a collective activity. Change Labs typically consist of 5–10 successive sessions between interventionist researcher(s), teachers, and management in the target educational institution. After some months, the initial sessions are often followed with new sessions. The overall aim is to change the object of activity by developing new and improved pedagogical practices, triggered by participants engaged in an iterative dialogue and discussion among themselves and with the management and interventionist researcher(s). The idea is to create a space where inner contradictions in the past and present activity can be traced. Acknowledgement of contradictions as tensions, disturbances, and disagreements in the organization as an activity system is crucial in creating a collaborative process of constructing new solutions leading to improved work practices in the future object of activity. In that way, contradictions can become a second stimulus-means to improve educational design, which is the object of the activity. It is important to mention that the double stimulation method is not fixed or without problems, but it is under constant scrutiny when employed as an analytical tool. One central problem concerns Vygotsky's belief in a neutral second stimulus. Engeström is aware of this and writes that "there are no neutral objects — every artifact has inherent affordances materially and historically inscribed in it" (Engeström 2007, p. 373). Furthermore, Lund and Rasmussen (2008) suggest extending the notion of double stimulation to include how available stimuli distributed among participants are used:

> Theoretically, we have extended the Vygotskian concept of double stimulation to embrace more than a neutral second stimulus on a microgenetic level. We see the need to include the tensions, affordances, and constraints that emerge between tasks and tools on a sociogenetic level. (p. 410)

As we can see, the problem of transferring the method of double stimulation from its original focus of processes of developmental learning in the subject to the sociogenetic level of distributed learning and agency is under debate and needs further exploration in research.

2.2 Linear versus formative interventions

Despite the questionable application of Vygotsky's concept of double stimulation to social settings, Engeström's key critical arguments about EDR and its limitations are better seen in relation to the principles of double stimulation. As outlined above, double stimulation is a way to understand processes of learning mediated by cultural artifacts, and can help us to analyze the role of stimulus-means used in design. The lack of this particular focus in EDR constitutes the main criticism of Engeström and his colleagues, and can be summarized in four points (Engeström 2007, 2009, 2011; Engeström and Sannino 2010):

1.) The making of the design in EDR is not included in the methodology because the process begins with the implementation of a prototype. Critical questions about who makes the design or the theory or principles behind it, are not considered.

2.) It is taken for granted that researchers determine the endpoints in EDR.

3.) Even though EDR differs from "gold standard"[1] interventions, by recognizing the complexity of educational settings, and proceeding through cyclic and multiple iterations to refine the design, the methodology is still dominated by a linear image of closure, control,

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[1] The standards for acceptable research, referred to as "the gold standard" in education, emphasizes evidence-based interventions, multiple research sites, large statistical samples, randomized controlled trials, and following patterns of evidence use in medicine, welfare policy, and agriculture. The content of the gold standard is greatly affected by: guidelines published by 'The What Works Clearinghouse' at the Institute of Education Sciences in the U.S. Department of Education: http://ies.ed.gov/ncee/wwc/; the No Child Left Behind Act of 2001: http://www2.ed.gov/policy/elsec/leg/esea02/index.html; and the Education Sciences Reform Act (H.R. 3801) of 2002: http://www2.ed.gov/policy/rschstat/leg/PL107-279.pdf. Web sites last checked 09/01/12.

and completeness.

4.) Design research compares the design of mass-produced products to that of educational innovations. This undermines the characteristics of open-endedness and continuous co-configuration in educational developmental research.

For Engeström, the double stimulation method works as a catalyst for the further elucidation of the methodological differences by drawing a distinction between *formative* interventions in Change Labs and *linear* interventions in EDR:

> Vytgotsky's methodological principle of double stimulation leads to a concept of formative interventions which are radically different from the linear interventions advocated both by the "gold standard" and by the literature on design experiments. (Engeström 2009, p. 320)

Furthermore, Engeström explains this point by writing:

> ...in discourse on "design experiments," scholars do not usually ask: Who does the design and why? It is tacitly assumed that researchers make the grand design, teachers implement it (and contribute to its modification), and students learn better as a result. This linear view ignores what sociologists teach us about interventions as contested terrains that are full of resistance, reinterpretation, and surprise from the actors in the design experiment. (Engeström 2007, p. 369)

Table 1 summarizes the differences between formative and linear interventions as articulated by Engeström and his colleagues (Engeström and Sannino 2010; Engeström 2009). In the next section of this article, I evaluate the validity of Engeström's critical contrasting view on EDR and Change Labs.

2.3 The validity of Engeström's criticism

Engeström's criticism of EDR (Engeström 2007, 2009, 2011; Engeström and Sannino 2010),

is mainly based on readings of Cobb et al. (2003) and Collins et al. (2004), two seminal articles

providing an overview of theoretical and methodological issues within EDR, but not the

	Formative intervention	Linear intervention
Researcher	The researcher intends to provoke and sustain an expansive transformation process led and owned by the practitioners.	The researcher seeks control of all the variables.
Start	The subjects (whether children or adult practitioners, or both) face a problematic and contradictory object that they analyze and expand by constructing a novel concept, the contents of which are not known ahead of time to the researchers.	The contents and goals of the intervention are known ahead of time by the researchers.
Process	The contents and course of the intervention are subject to negotiation and the shape of the intervention is eventually up to the subjects. Double stimulation as the core mechanism implies that the subjects gain agency and take charge of the process.	The subjects, typically teachers and students in school, are expected to execute the intervention without resistance or arguments. Difficulties of reception and execution are interpreted as weaknesses in the design that are to be corrected by refining it.
Outcome	The aim is to generate intermediate and new concepts that may be used in other settings as tools in the design of new locally appropriate solutions. A key outcome of formative interventions is agency among the participants.	The aim is to control all the variables and to achieve a standardized solution module, typically a new learning environment that will reliably generate the same desired outcomes when transferred and implemented in new settings.

Table 1 Characteristics and differences between formative and linear interventions

whole picture because it has evolved until today. It must be said that Engeström is somehow aware of the inadequacy of his criticism in a proceeding paper that: "There might be design experiment studies that overcome the limitations," and "my criticism is necessarily somewhat simplified and treats Educational Design Research as a totality without much nuance." (Engeström 2008, p. 20). Another issue in the validity of Engeström's criticism is that Change Labs has mainly focused on formative interventions in public and private organizations and companies not limited to educational institutions, while EDR has primarily been conducted in classroom settings. This fact is rhetorically reflected upon by Engeström (2008): "If formative interventions are inapplicable in school settings, perhaps the two methods just cannot be compared and my criticism of design experiments is misplaced" (p. 20). However, Engeström dismisses his own hypothetical concern about formative interventions being inapplicable in school settings, by reminding us about a series of Change Labs that have actually been successful in schools: "In fact, Change Laboratories have been conducted in schools. My research group ran a series of successful Change Laboratories in a middle school in Helsinki" (p. 20). In his latest publication containing criticism of EDR, Engeström (2011) maintains that recent collections on design research has not been able to overcome the fundamental limitations:

> There are certainly individual design experiments studies, which in significant ways have been able to overcome some of these limitations. However, recent collections on Design Research (Akker et al. 2006; Kelly et al. 2008) mainly enrich and elaborate rather than question and challenge the basic assumptions laid out in key papers a few years earlier. (p. 602)

It is interesting to follow up the claim in the quote above: Do recent writings on EDR still enrich and elaborate the basic assumptions, or do they question and challenge them? To answer this question, I studied an introductory collection on EDR, which is not included in Engeström's criticism. The collection is edited by Dutch experts in the field of EDR (Plomp

and Nieveen 2010). I reviewed the contributions in relation to Engeström's four main critical points to EDR listed earlier in this article. In the introduction chapter it seems that Plomp (2010) argues for greater involvement of practitioners in EDR:

> Starting point for Design Research are educational problems for which no or only a few validated principles ('how to do' guidelines or heuristics) are available to structure and support the design and development activities. Informed by prior research and review of relevant literature, *researchers in collaboration with practitioners design and develop workable and effective interventions* by carefully studying successive versions (or prototypes) of interventions in their target contexts, and in doing so they reflect on their research process with the purpose to produce design principles. (p. 13, my italics)

> One of the features of Design Research is the collaboration of researchers and practitioners. This collaboration increases the chance that the intervention will indeed become practical and relevant for the educational context, which increases the probability for a successful implementation. But the participation of practitioners should also be seen as an important form of professional development. An extra spin-off may be that practitioners will develop an awareness of how research may contribute to improving their professional context (p. 22)

Does this indicate a shift in EDR towards increased emphasis on the role of practitioners, both in the development of the design and as learners in the process? If so, there is a criticism of the applicability of EDR in the inclusion of participants in design. This is that the prototype is still emphasized as a key feature of the initial intervention process: "A prototype is a preliminary version of the whole or a part of an intervention before full commitment is made to construct and implement the final product" (Nieveen 2010, p. 90). It is not clear *if,* or at which stage researchers are expected to collaborate with practitioners in the process of

prototype revision, because expert judgments are still emphasized as the main force in this process: "Early prototypes can be just paper-based, for which the formative evaluation takes place via expert judgments" (Plomp 2010, p. 27). This contradictory nature of the role of participants in EDR is evident in the following passage:

> Respondents with a *learner* role are not specifically expert in the subject matter, which is covered by the materials. One could think of students who learn a new subject, but also teachers who have not taught in a certain manner before. In many cases, experts represent this category as well. For instance, educational technology experts do not always have expertise in the subject matter domain of the educational intervention. They will take the role of a learner first, before they will give comments on matters related to educational technology (in which they are experts). *Critics* are respondents who are asked to comment on the materials from the perspective of their expertise. This group consists, for instance, of subject matter experts and teachers who are invited to make statements about the difficulty or readability of learner materials. *Revisors* will not only give comments on the materials (as critics do), but they will also provide suggestions for improvements. For instance, a subject matter expert may indicate what type of 'state-of-the-art knowledge' is missing in the learner materials and where this knowledge could be found. It is important to note that individuals may play several roles simultaneously during the formative evaluation. (Nieveen 2010, pp. 97–98)

On one hand, invited expert practitioners are given roles as *learners*, *critics*, or *revisors* in formative evaluation of materials, but on the other hand, a clear focus on making subjects *masters* of the intervention as highlighted in Change Labs is still missing in EDR. Engeström's claim that "making of the design is not included in the methodology because the process begins with implementation of a prototype", does not account for all the articles on EDR in Plomp and Nieveen (2010). A reference to Reeves' model of the process of EDR

illustrates this point:

> *Stage 1*: Identification and analysis of problems by researchers and practitioners in collaboration
>
> *Stage 2*: Development of prototype solutions: informed by state-of-art theory, existing design principles and technology innovations
>
> *Stage 3*: Iterative cycles of testing and refinement of solutions in practice
>
> *Stage 4*: Reflection to produce 'design principles' and enhance solution implementation in practice. (Reeves 2006, cited in Plomp and Nieveen 2010, p. 14)

According to this model, the goal in the first stage is researchers and practitioners collaborating to identify and analyze problems. The process of identifying the problem as a first stimulus is very much in line with the initial phases of Change Labs. According to Plomp (2010), a prototype is not ready for implementation in the initial phase of an EDR experiment:

> As knowledge is incorporated in interventions, it is profitable for Design Researchers in the early stage of their research to search for already available interventions that can be considered useful examples or sources of inspiration for the problem at stake. Careful analysis of such examples in combination with reviewing relevant literature will generate ideas for the new design task. (p. 21)

'Already available interventions' are available objects (prototypes) working as examples and inspiration. They become tools that can be utilized in problem-solving efforts, and again this is in line with principles in Change Labs, namely the principle of second stimulus in the method of double stimulation.

I end this brief review of the validity of Engeström's criticism by questioning his points about the EDR methodology being dominated by a linear image aiming at closure, as well as undermining the characteristics of open-endedness and continuous co-configuration. I find several passages in Plomp and Nieveen (2010) that to some extend contradicts this argument. For instance, as outlined above, there are elements of co-configuration that are similar to the principles of first and second stimulus. Furthermore, they emphasize the heuristic nature of EDR and warn about generalizing from one experiment to another:

> Where design principles may have been supported by a number of replications, and a new context may be similar to the ones from which design principles have emerged, yet each context has unique characteristics that justifies that the design principles should be used as 'heuristic' statements: they provide guidance and direction, but do not give 'certainties'. It is in this context that Reeves (2006) cites Lee Cronbach, one of the most influential researchers of the 20th century: "When we give proper weight to local conditions, any generalization is a working hypothesis, not a conclusion (Cronbach 1975, p. 125)." (Plomp 2010, p. 22).

By reviewing Engeström's critical comments about the limitations of EDR, I intend to show that his criticism is generally valid, but in light of recent writings on EDR, methodology must be questioned when strict generalizations are drawn.

In the last part of this article, I address some limitations of the EDR methodology related to challenges faced by EDR researchers. I focus on two concepts that represent challenges in conducting intervention research relevant to both Change Labs and EDR, namely *contradictions* and *the object of activity*. I claim that it is necessary to view these two concepts as interrelated and in relation to the double stimulation method, to better address complexity and contradictions between the past, present, and future object of activity.

3 Contradictions and the object of activity

In a recent paper in this journal, Akkerman et al. (2011) call for more transparency in decision-making processes in EDR to overcome tensions related to conflicting motives and to enhance the researchers' agency, exemplified by the PhD researcher, Ilya:

> The tensions faced by Ilya also illustrate how conflicts in motives can emerge and how these are often intuitively managed during ongoing actions. We propose that more transparency in decision-making processes in EDR is needed, and hoped to have offered and initial framework with which to grasp and anticipate the complex dynamics of EDR. Transparency is desirable not only for maintaining and improving methodological rigor (which clearly is a research motive), but also to enhance researchers' sense of agency and deliberate shifts in subject positions in the process. (p. 17)

In the following, I claim that EDR researchers can cope better with conflicting motives by learning from the methodology of Change Labs to enhance not only the researchers', but also equally importantly the practitioners' sense of agency. An important step in this process is working with the root causes of conflicting motives by focusing on systemic contradictions between and within the activity systems in play. Akkerman et al. have a similar approach in their explanation of difficulties faced by the EDR researcher dealing with conflicting research positions:

> An analysis of challenges in the case study shows the difficulty for the EDR researcher to understand and disentangle underlying motives during the research process, but also the difficulty of dealing with different, easily conflicting research positions, resources, quality rules, time frames, audiences and products. (Akkerman et al., p. 1)

Underlying motives are connected to three intersecting epistemic practices of (1) educational research, (2) educational design, and (3) educational change. CHAT is used as an analytical

lens to view the three practices, each resting on three different epistemic cultures that consist of different tools, rules, and division of labor that simultaneously confront the EDR researcher, thus illustrating the complex nature of EDR. Akkerman et al. provide a valuable new insight into structural challenges faced in EDR and intervention research in general, by showing how "the EDR researcher has triple motives and has to live up to the standards and norms of three different epistemic cultures at the same time" (p. 14). However, by limiting their focus to the larger epistemic cultures surrounding the EDR researcher's scope of action, they analyze complexity as if EDR were a fixed and complete methodology without limitations in its nature.

As mentioned above, Akkerman et al. (2011) question why EDR is complex *by nature.* However, an equally important question is *why* the EDR researcher faces complexity in one of its most important research objectives: to create a collaborative space for ideas to grow into enhanced practice and technological design. In this connection, Akkerman et al. omit to address the tensions, misunderstandings, disagreements, and dilemmas that can evolve through interaction over time between intervention researchers and participants. These discursive disturbances may stem from contradictions between the new design as a culturally more advanced form of activity and the existing design as the dominant central activity. In CHAT, this type of tension is referred to as the *tertiary contradiction*:

> The tertiary contradiction appears when representatives of culture (e.g., teachers) introduce the object and motive of a culturally more advanced form of the central activity into the dominant form of the central activity. For example, the primary school pupil goes to school in order to play with his mates (the dominant motive), but the parents and the teacher try to make him study seriously (the culturally more advanced motive). The culturally more advanced object and motive may also be actively sought by the subjects of the central activity themselves. (Engeström 1987, p. 45)

A tertiary contradiction in intervention research between the old form of the central activity

within the educational target institution (e.g., a school, a university, a vocational training center,

etc.) and the new form of a culturally more advanced design and activity can be pictured

as in Fig. 1.
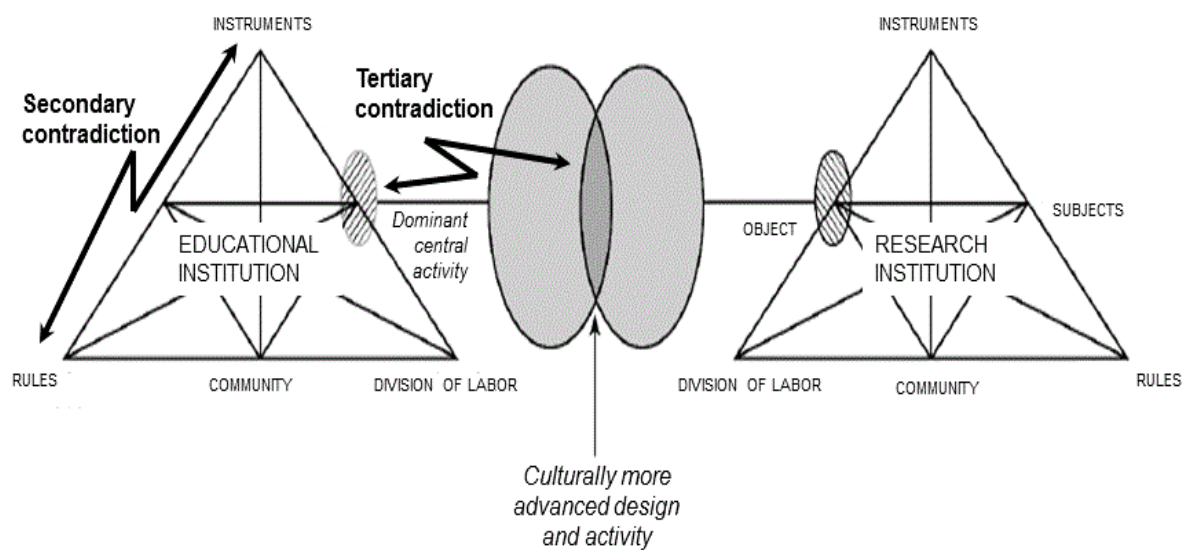
Fig. 1 Tertiary and secondary contradictions. Visualized in Engeström's model of two interacting activity systems (Engeström 2001, p. 136)

A tertiary contradiction creates complexity and challenges in the process of co-constructing

a shared object of activity, which is a culturally more advanced design, hence the contradiction

needs to be recognized and worked on collaboratively to become a potential key

to change instead of an obstacle. This process necessitates rethinking and readjusting existing

aspects in the activity system of the target institution because tertiary contradictions are

interconnected with *secondary contradictions.* The secondary contradictions are those appearing

between the corners. The stiff hierarchical division of labor lagging behind and preventing the possibilities opened by advanced instruments is a typical example. (Engeström 1987, p. 45) Secondary contradictions arise between aspects in the activity system causing what Bateson (1972) refers to as double-bind situations. As an example pictured in Fig. 1, a secondary contradiction occurs if the culturally more advanced design introduces a new instrument in the target institutions, but the existing rules do not allow for reorganization of practice, which is a precondition for efficient use of the new instrument. In this situation, a double bind is the dilemma when, for example, further economic investment by the leadership in the target institution depends on the efficient function of the instrument without any necessary collaborative work in the institution to resolve the secondary contradiction.

When a tertiary contradiction between the object of new and old design occurs, paying attention to the secondary contradictions that arise between, for example, new instruments and old rules should be a key point in intervention research. As mentioned above, contradictions are not merely viewed obstacles, but more importantly, as keys to change and improvements if researchers and participants can recognize and work with the implications of contradictions in practice. Thus, contradictions can work as a mediating second stimulus to improve practice and design further. As Edwards et al. (2009) point out:

> The idea of secondary contradictions is helpful because it requires us to look at the contradictions between existing aspects of a system that arise when a new element is introduced and to see how a system might respond to an idea by working on the contradiction rather than by ignoring it. (p. 112)

An important objective for any intervention researcher should be to enable participants to analyze their professional practices in light of contradictions between past, present and the future activity. Formative interventions and the method of dual stimulation are helpful tools

in this work. It is a challenge to make contradictions productive of change. Hence, researchers should dare to raise challenging and contested issues with participants dialogically (Linell 2009). Furthermore, a dialogical approach to learning makes it necessary for intervention research to take a closer look at the resources brought by participants as they interpret and respond to the object of their work. These processes involve bending the rules governing the dominant work practice and create new recourses to help establish shared object of activity and thereby improved practice.

The object of activity is a tricky concept in CHAT because of the various interpretations of its meaning. Akkerman et al. interpret the object of activity as something describing the object(ive) of any *present* activity. This interpretation is not accurate, because in the initial phases of any intervention research the object of activity is not yet established. In the initial phase, it is more precise to view the object of activity as a *potential* object of activity that will be developed further, in relation to the purpose and aim of the intervention and through cyclic alterations of the design. As Kaptelinin (2005) points out, and relevant to my point here, there are challenges related to the double meaning of the word 'object,' which may be (1) an object in a material sense and (2) object(ive) as goal-oriented action and activity. Furthermore, the usefulness of *the object of activity* is achieved by separating the object of activity from *the motive of activity*. This analytical move makes it possible to consider that "the object of activity can undergo developmental changes that take place over a relatively long period of time, even though the basic motives of the activity do not seem to change" (Kaptelinin 2005, p. 14). However, it is important to notice that some leading scholars within CHAT do not seem concerned about separating the motive from the object of activity, but interpret the object of activity more in relation to Leontiev's original definition of the object of activity as its true motive:

> The object motive, how the object of activity is interpreted by participants in the activity, directs activities. For example, a student teacher who sees teaching as a matter of

maintaining control will operate differently in the activity of teaching a lesson from another student teacher who sees it as enthusing children as learners. (Ellis et al. 2010, p. 9)

I agree that participants' interpretation of the object of activity influences how they operate in the activity. The intervention researcher should nevertheless be aware that although viewing *the object motive* as the main dimension directing activities may be important; this should not lead to relative neglect of other possible factors besides the underlying motive determining actions made by people.

A relative unimportant thing can be quite urgent, so that dealing with undeniably more important issues can be postponed. Also, some people are willing to take risks and pursue less important and even potentially dangerous goals if they think the level of risk is acceptable. (Kaptelinin 2005, p. 14)

This indicates that various constraints in addition to motives, involving change in available means and multiple factors determining people's choices, form the basis upon which objects of activities are dynamically constructed over time. It is in relation to this that the limitations of the use of CHAT by Akkerman et al. to explain complexity in EDR become visible. They do not address the contested concept of the object of activity on the sociogenetic level when analyzing challenges faced by Ilya during her EDR research. Instead, they employ CHAT in a more structural and systemic way by emphasizing the larger activity systems of three epistemic practices. As mentioned earlier, this framework works well as an illustration of complexity complementing earlier EDR scholars' attempts to describe complexity mainly as challenges in linking theory to practice. However, as outlined in this article, much work remains to develop a more thorough framework to analyze Ilya's challenges in situ. If we are to take Kaptelinin's (2005) insights serious, the work includes incorporating secondary and tertiary contradictions along with the dynamic nature of the object of activity in the analysis:

...objects of activities are dynamically constructed on the basis of various types of constraints. These constraints include the needs that the activity at hand is striving to satisfy, available means, other potentially related activities, and other actors involved, each with their own motives and objects. (p. 17)

4 Conclusions

Based on the point of view presented in this article, I argue that EDR researchers would benefit from incorporating the concepts of double stimulation, contradictions, and the object of activity in future analyses of their challenges. However, the quest to understand fully the challenges and complexity of both Change Labs and EDR is far from finished. This point indicates a need for further advancements synthesizing EDR and other intervention research approaches in education, exemplified in this article by Change Labs. I wonder why leading EDR researchers and Engeström and his colleagues do not quote each other when reporting their intervention findings. In my opinion, the two methodologies would be much better off creating space for dialogue instead of criticizing or ignoring each other, especially because theory development to help bridge the gap between research and practice is the *real thing* for both approaches. Akkerman et al. apply the ideas of CHAT to explain complexity faced by a PhD student without addressing the tangible complexity that lies within the process of introducing a design as a second stimulus, and then focus on the potential tensions that arise when the intervention design contradicts existing design. Therefore, the formative intervention approach currently used in Change Labs with its stronger focus on empowering agency in subjects and involving participants in making the design has more to offer the interventionist researcher struggling to understand tensions, disagreements and dilemmas and provides tools to work on them. The analytical strengths of Change Labs compared to EDR are related to dialogical interpretation of the object of activity and contradictions as mediating artifacts and instruments with the potential power to transform and improve educational practice.

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