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**Title**

Expansive learning in medical education: putting Change Laboratory to work

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## **Summary**

This paper explores the purposeful use of conceptual and methodological tools provided by Cultural Historical Activity Theory (CHAT) to transform learning cultures and practices within and across diverse clinical learning environments. We describe how Change Laboratory methodology helped clinicians and others who support student, intern and resident education to make changes collaboratively. A case study in undergraduate medical education shows how this created new forms of medical student placement and a postgraduate study shows how it addressed supervisors' undermining behaviour towards Obstetrics and Gynaecology residents. This empirical work illustrates ways of modifying the classical Change Laboratory process to fit to local contexts, resources and needs. We conclude with lessons learned and future directions for practitioner-researchers who wish to broaden the range of methodological tools they use to transform clinical learning environments.

## **Keywords**

## **Practice points**

## Introduction

Sfard argued that our views on learning influence our work as educators and researchers, which she illustrated by defining two metaphors for learning: acquisition and participation (Sfard 1998). Learning-as-acquisition (loosely aligned to cognitive-behavioural theories) emphasises individual learners' acquisition of knowledge and skills. Learning -as-participation (drawing on socio-cultural theories) emphasises processes of becoming members of Communities of Practice (Lave and Wenger 1991). Most of the knowledge learned by participating is embedded in pre-existing work practices. Activity theory offers a *third* metaphor, learning-by-expansion, where learning creates new forms of knowledge and activity Engeström (2011a).

Expansive learning takes place when established ways of doing things are no longer viable or desirable because *contradictions* in work practices have accumulated. As a result:

*'Individuals begin to question the existing order and logic of their activity. As more actors join in, a collaborative analysis and modelling of the zone of proximal development are initiated and carried out. Eventually the learning effort of implementing a new model of the activity encompasses all members and elements of the collective activity system.'* Engeström 2011a p91

Vygotsky's Zone of Proximal Development (ZPD), the distance between what active engagement with others helps a learner achieve compared with what they can achieve independently, is a vital concept. This emerged from the double stimulation method, where investigators gave children tools or prompts to extend their abilities to solve problems independently (Vygotsky 1978). Expansive learning, drawing on CHAT principles, is a product of the social dynamics between humans, played out within the material, cultural and historical contexts of work practices (Engeström and Sannino 2010; Engeström and Pyörälä

2020, this issue). The ZPD is the distance between existing and new potential models of activity systems. Change Laboratory is a collaborative intervention, which uses double stimulation to move activities through their ZPD and generate new practices.

### **The Change Laboratory**

Change Laboratory is a system level (beyond individuals and teams) interventionist research methodology, which charts and analyses existing practices in-depth and purposefully co-creates new forms of work activity (Virkkunen and Newnham 2013; Engeström and Pyörälä 2020, this issue). It uses conceptual tools provided by CHAT (Engeström 1999), which view work activities as individual and collective actions mediated by *artefacts* (physical and conceptual ‘tools of the trade’). *Activity systems* (such as clinical departments) are *object-orientated*; that is, they have a shared object of activity (a purpose) such as training future doctors whilst also giving patients high quality care. The work of activity systems is shaped by history and culture (‘how we do things around here’) and influenced by multiple voices and viewpoints on practice (eg patients, carers, medical and nursing staff, managers). Over time, the accumulation of structural tensions within and between activity systems creates contradictions: for example, between the need to staff clinical services and train residents, which may not be aligned with one another. Tensions or contradictions between work and learning may arise, for example, when patients’ needs dominate decision-making about who does what, where and with whom. These tensions are creative forces for change, which expose the potential for expansive learning. The Change Laboratory process expands learning by developing new practices.

Figure 1 shows how a Change Laboratory intervention works through an expansive learning cycle, collectively creating and testing out new forms of work activity. The *multi-voicedness* of this process is crucial; since practice is socially and culturally embedded, sustainable

developments of practice require input from all involved. The approach enables transformation rather than mere transmission of culture, allowing learning *for change* rather than the learning *for stability* that tends to be the norm in historically rooted and rigid clinical workspaces. The potential utility of Change Laboratory is obvious when one considers the resistance to change that exists in clinical practices that have to keep pace with changes in treatments and technologies (Engeström 2018).

**Figure 1 about here:**

Change Laboratory *'bring(s) work redesign closer to the daily shop floor practice while still keeping it analytical – a new dialectic of close embeddedness and reflective distancing'*

(Virkkunen et al 2013 pp 24). Researchers are interventionists, who gather qualitative data (such as video recordings, observational field notes, conversations with workers) and use this to 'mirror' existing practice, in all its messiness, to Change Laboratory participants (Engeström and Pyörälä 2020, this issue). This double stimulation helps participants engage in a form of reflective distancing (Virkkunen et al 2013) from their own and their co-workers' views, actions, and motivations. Participants then collectively model and test out new forms of activity. This process typically needs five to twelve 2-hour sessions over a number of months. Table 1 gives details of selected Change Laboratory studies, each of which illustrates a re-thinking and transformation of a complex practice in education, health and social care.

**Table 1 about here**

**Our Change Laboratory Case Studies**

Table 1 shows what experienced researcher-interventionists can achieve. This article explores how practitioner-researchers might adopt Change Laboratory and adapt it to address the

cultures and practices of clinical learning environments. We have used it to expose the historical and cultural roots of existing activity whilst engaging stakeholders in co-constructing new and shared objects of activity. The first case study illustrates how clinical, administrative and academic staff co-created medical student assistant placements across a range of settings in Leeds, UK (Reid et al 2015). The second draws on work to transform learning cultures in postgraduate Obstetrics and Gynaecology (O&G) training, London, UK.

**Box about here**

**Figure 2 about here**

**Figure 3 about here**

These Case Studies show how the methodological tools of Change Laboratory can help reconfigure historical working relationships and practices. In CL1, practitioners in two interacting activity systems came together to re-think clinical placements. Envisioning students as ‘assistants’, able to make a more active contribution to patient care rather than ‘students’ in a more passive role, bridged the ZPD. CL2 created a ‘safe space’ where doctors, nurses and midwives used the conceptual tools to re-think their currently ‘siloes’ working practices (see Varpio and Teunissen 2020 and Grilo Diniz et al. 2020 in this issue analysing obstetric care). This identified strategies to foster closer working-learning relationships and more joined-up care. These included multi-professional ‘huddles’ on all wards, briefing clinicians before and debriefing them after antenatal clinics and conducting multi-professional in-situ simulations. Both projects posed problems that required local modifications to Change Laboratory procedures.

### **Implementing Change Laboratories in time-poor clinical workplaces**

*‘To be successful, the Change Laboratory process has to be continuous and intensive (...) There is often a strong pressure to reduce the amount of time reserved for the process.’ (Virkkunen et al 2013:66)*

It proved difficult to get large groups of clinicians to attend together, which is needed to make Change Laboratory discussions multi-voiced and able to overcome historical tensions, hierarchies and power dynamics. In CL1, placements made progress when a consultant, junior doctor, senior nurse, and placement co-ordinator attended, but were less successful when only a limited range of voices were heard. Releasing staff to attend CL2 was challenging so many participants chose to come in on non-working days. Participants were extremely reluctant at first to take part in multi-professional discussions so we started with profession-specific sessions, which analysed and made visible points of connectedness, and established trust. Work pressures in clinical systems made the composition of CL2 sessions different every time, although each had representation from nursing, midwifery and medicine, including trainees.

Both studies introduced practitioners to the principles of CHAT, though more in-depth analysis was undertaken by core team members for pragmatic reasons. It was not possible (nor necessarily appropriate) to video-record authentic clinical care for use as 'mirror data'; instead, both teams spent time observing practice and discussing their observations with practitioners both within and outwith sessions. Existing data such as placement evaluation responses and official surveys of trainees' experiences supplemented this in helpful ways. These alternative sources encouraged participants to reflect critically on historic practices and the 'ways things are done around here'.

### **Achieving 'buy-in'**

Our studies confirm that '*readiness for and capability of expansive development varies between local instances of the same activity*' (Virkkunen et al 2013:65). A number of different factors showed when teams were ready for expansive development work, including: willingness to work collaboratively across professional roles and hierarchies, commitment to



participating in sessions away from day-to-day work activity and genuine support from healthcare managers. Workplaces varied in the degree to which managers and frontline staff ‘bought in’ to the Change Laboratory approach. In CL1, we recruited providers who were interested in making improvements and whose placements had been positively evaluated by students. Despite this, the degree to which workplaces were ready for students to take on more active roles in clinical work varied widely (see Reid et al., 2015). One workplace, for example, had a very risk-averse culture because patient safety was high on the management agenda. This made it much harder for students to be seen as valuable contributors to patient care.

Blackler (2009) noted that *“the terms under which any research project is commissioned are likely to limit what is possible and one does what one can, given the opportunities that can be arranged.”* Commissioners of the CL2 project invested considerable effort in finding pilot sites with senior level ‘buy-in’. Even so, the project team had to negotiate hard to ensure the right mix of practitioners was released and supported to take part. A useful adaptation was to invite a senior manager to join the last half-hour of every Change Laboratory, to be briefed on the changes being proposed and asked to support them before clinicians on wards and in clinics were told.

### **Facilitating Change Laboratories as practitioner-researchers**

The success of interventions of the type we describe here is influenced by practitioners’ and managers’ motivation to find solutions for (externally) recognised issues, the availability of expertise in CHAT and prior knowledge or experience of Change Laboratory methods (Virkkunen and Newham 2013). Whilst we were familiar with the conceptual tools of CHAT, these projects were our first experience of Change Laboratory. Team make-up was key to achieving systems-level change. In CL1, the University team comprised experienced

educators and researchers, some of whom had worked with the tools of CHAT before, and expert facilitators who could enquire about taken-for-granted practices and allow multiple voices to be heard. CL2 included an experienced qualitative researcher who had worked with CHAT and had experience of facilitating multi-professional groups in clinical environments. In addition, two education and leadership fellows played a pivotal in this complex intervention because they were able to spend time observing and discussing workplace environments, cultures and practices. They mediated between practitioners and senior leaders and, importantly, championed changes that arose from the Change Laboratory sessions in very practical ways.

### **Lessons learnt and future directions**

This paper illustrates how the tools of CHAT can be put to use by practitioner-researchers seeking to transform the culture and practice of clinical learning environments. We see three-fold value in the Change Laboratory process. First, it moves our gaze from reproducing individual practices to engaging purposefully with aspects of learning environments and cultures that too often stifle innovation. Second, both case studies show how bringing together clinical practice and workplace learning focuses patient care as the shared object of activity. Third, the emphasis on collective and multi-voiced practice invites engagement within and between medical education and healthcare systems. Change Laboratory has the potential to open silos and foster respectful, creative working relationships.

We propose that making members of different professions aware of their interdependency and making explicit the purposes, practices and divisions of labour in their clinical work is key to making sense of complex clinical learning environments. Despite being rooted in theories of Vygotsky and Leont'ev from the early 20<sup>th</sup> Century, CHAT is highly relevant to problems in 21<sup>st</sup> century practice, whose complexity lends itself poorly to care processes that

are rooted in historically-set divisions of labour. Change Laboratory offers a new way of conducting the shared redesign and reworking of complex care systems, which may otherwise be defeated by complexities of systems that prevent education translating into improved patient outcomes (see Teodorczuk and MacLulich 2018). It can be hard, at first, to understand the conceptual and methodological tools of CHAT, which require clinical educators to rethink, radically, the relationship between learning and system development. Embracing the third metaphor, learning-as-expansion, is a vital jumping off point. It is worth seeking out people with knowledge and experience, who can support first attempts to make change. If they are not available, practitioner-researchers with qualitative experience might use familiar ways of collecting data to distance themselves, reflectively, from practices with which they are (over-) familiar. This can help formulate and solve problems collectively. Leaders of change need to use good facilitation skills to create safe spaces where it is possible to question historical practices and tentatively try out new ones.

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### **Declaration of interests statement**

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Table 1

Authors	Context of Change Laboratory work	Work done and implications
Engeström et al. 2003	Fragmentation of care services for children with complex healthcare needs in Finland. Healthcare teams (specialist doctors, nurses, allied health professionals and administrative staff) responsible for treating children with long-term conditions took part in ten sessions.	Professionals questioned current practices within their historical and socio-cultural context. Thought-provoking testimony from the children and families showed how care was fragmented. To support new ways of working, a shared 'Care Plan' brought together patients' health and social needs in a combined treatment plan, used by all professionals. This mediating tool helped professionals focus on an <i>expanded</i> object of activity (Engeström 2001): the whole patient with holistic needs. In contrast to a series of individual treatment plans owned by each specialist, the combined plan helped each professional develop an explicit understanding of the role of others and their interrelationships. Monitoring, evaluating and refining the care plan helped develop a more integrated service.
Virkkunen et al. 2010	Physiotherapy education; a shared endeavour between universities and workplaces. Contradictions arose in priorities and meeting the needs of both professionals in training and physiotherapy clients. Change Laboratories involving representatives of	Moving from a traditional vocational apprenticeship to a more standardised and specialized university education changed the focus of internship from primarily addressing the functional needs of clients to a broader emphasis, which included knowledge of the underlying disease and impairments, as required for the qualification. The Change Laboratory sessions addressed tensions, which had arisen from unearthing competing

	<p>a university and workplace explored the specific challenges faced and envisaged new ways of working.</p>	<p>agendas that arose from the historical development of physiotherapy education. Change Laboratory successfully expanded the object of internship, bringing clients' functional needs within their life context into focus. This both transformed the conceptualisation of physiotherapy teaching and empowered clients by taking greater account of their holistic needs.</p>
<p>Edwards et al. 2009.</p>	<p>Professionals who delivered services for children and young people with particular social welfare needs in the UK.</p> <p>The study aimed to understand the challenges of working across agencies and activity systems to meet the needs of children and families.</p>	<p>The research team conducted Developmental Work Research (DWR) with professionals who supported children and families in need (educational psychologists, teachers, educational welfare staff, speech &amp; language therapists). A series of Change Laboratory workshops explored how professionals negotiated their individual expertise with others' expertise in order to work effectively for children and families. The research intervention aimed to expand learning by developing new ways for professionals to relate to each other across agency boundaries. The authors noted that 'relational expertise' mediated cross- boundary and inter-organisational learning. This was made necessary by the dynamic nature of the relationship between individual and collective agency, and the need to negotiate professional expertise.</p>

## Box

Change Laboratory 1 (CL1). Developing final year undergraduate placements through partnership working with hospital teams (Reid et al., 2015)

The General Medical Council (2009) requires student assistantships in the final year of UK undergraduate medicine studies. This is '*a period during which a student acts as assistant to a junior doctor, with defined duties under appropriate supervision*' (p.2) and is '*primarily about preparing students for practice*' (p.15). Our University team moved away from a classic top-down approach by working closely with hospital teams to explore what assistantship placements their particular workplaces could provide. Three 3-hour Change Laboratories with each of three different hospital teams explored the social, cultural, and historical influences on placement learning and how each workplace could help final year students take on more active roles in clinical work. Rather than focussing on the preparedness of individual students (Kilminster et al 2011), we implemented system-level changes to achieve the shared object of students contributing to patient care.

See Figure 2

Change Laboratory 2 (CL2): *Change tO+Gether Better* project commissioned by Health Education England, North Central East London.

UK residents' ratings of O&G learning environments are poor because undermining behaviour by supervisors is widespread (RCOG 2020). Previous interventions have tried to change the workplace behaviour of individuals with limited success. This work frames undermining as a systemic issue arising from processes and practices that lessen teams' abilities to work well together. A team of three practitioner-researchers used Change Laboratory methodology to work through an expansive learning cycle with teams in a large maternity unit. The year-long project first conducted an activity system analysis to identify structurally-accumulated tensions and contradictions (See Figure 3) Eight 3-hour Change Laboratory sessions enabled practitioners to identify, introduce, review and embed ways of working that could achieve the shared object of higher quality training and safer patient care.



Fig 1. Steps of expansive learning (after Engeström et al 1996)

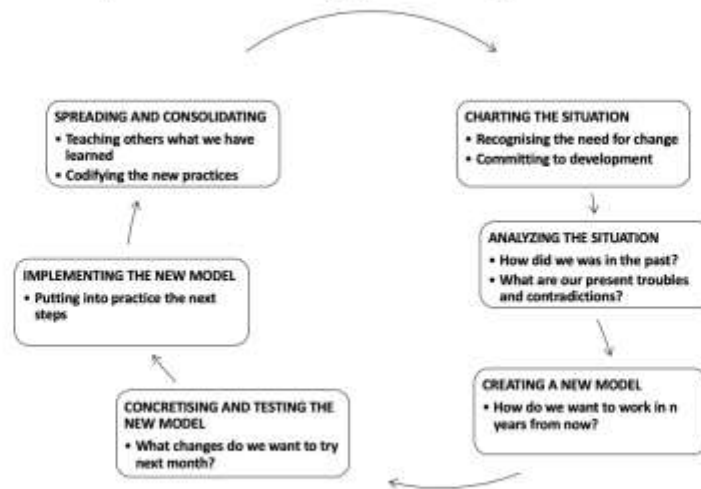


Fig 2 - CL1. Assistantship placements

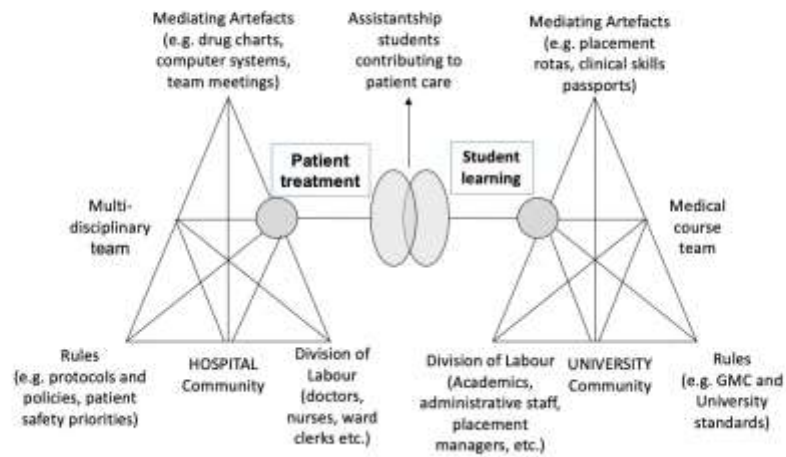
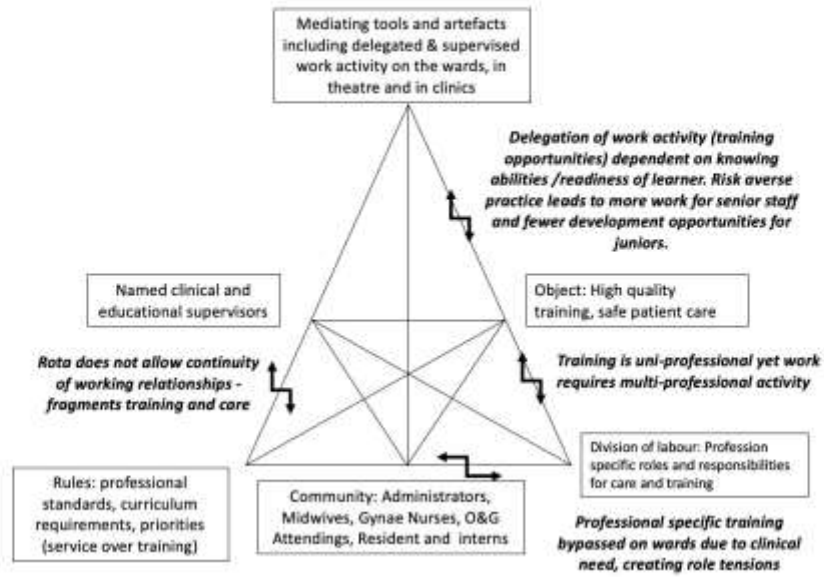


Fig 3 - CL2. Examples of tensions in the system



## Captions

Caption to Figure 1: Steps of expansive learning (after Engeström et al 1996)

Caption to Figure 2: CL1. Assistantship placements

Caption to Figure 3: CL2. Examples of tensions in the system