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Distributed Creativity and Expansive Learning in a Teacher Training School's Change Laboratory

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Abstract

Our chapter presents a case study of distributed creativity and expansive learning in the context of a teacher training school in Finland facing transformational needs due to a curriculum reform. We report on an analysis of a Change Laboratory (CL) process of six meetings involving a group of teachers, their headmaster and researchers. Drawing from sociocultural theories on creativity and the theory of expansive learning, we set out to explore how creative acts emerged during the CL and how the interactive creative process contributed to expansive learning. Our findings illustrate that the creative learning process was socio-materially mediated through the participants' discourse and tool use. The multiple consecutive creative acts, taken by the participants, generated "creative leaps", which contributed to expansive learning actions and the materialization of the process into creative products. Consequently, the creative process resulted in a new tangible artefact: a shared pedagogical leadership model and a new collective conceptualization of the leadership activity for the school community. Our findings point to the need to analyse creativity not purely as independent actions but also as collective activity. Our study offers a novel analytical method for analysing and conceptualizing processes of distributed creativity as a learning activity in organizations. Our study also contributes to the understanding of creativity as a distributed process intertwined with expansive learning.

Keywords

Distributed creativity, Expansive learning, Change Laboratory, Teacher training, Cultural-historical activity-theory

Introduction

In psychological studies, creativity is often defined as the capacity of an individual to create original and useful ideas, insights and solutions (see e.g., Amabile, 1996; Ekvall, 1996; West, 1990; Woodman et al., 1993; Sternberg & Lubart, 1999). However, in recent years, as a response to the literature concerning creativity as a quality and mental property of an individual, or as a novel outcome of an individual's action, we can find an increasing number of studies suggesting that this individualistic notion needs to be complemented with a broader approach, examining creativity as a multidimensional, collective and collaborative phenomenon (Csikszentmihalyi, 1996; John-Steiner, 2000; Sawyer & deZutter, 2009; Glaveanu, 2011; Sawyer, 2012; Littleton et al., 2012; Sannino & Ellis, 2013; Runco & Beghetto, 2019; Slayton et al., 2019; Glaveanu et al., 2020). From this perspective, the social context, culture and communities of actors with different understandings (e.g., novices and experts) are considered central in contributing to the creative processes (Drazin et al., 1999; Glaveanu, 2011; Sawyer, 2004) and practices, such as problem-solving (Segers et al., 2018) leading to novel outcomes (Hakkarainen et al., 2013; Oddane, 2014).

Nurturing creativity and finding ways to support the creation of new collaborative practices suited to local contexts is important for organizational transformation and learning. This is the case in educational contexts and for teachers' professional learning to meet the challenges posed by the knowledge society and the fast-changing world of the 21st century (Córdova et al., 2012; Hakkarainen et al., 2013). Hence, in the current context of education and schools, supporting and enhancing students' and teachers' creativity is pivotal (Ellis, 2013; Miettinen, 2013). The available research evidence has also pointed to the significance of creativity for enhancing student's agency and expertise, and by doing so, has taken educational systems beyond traditional school learning (Yamazumi, 2013; Hakkarainen et al., 2013). Furthermore, creativity has been shown to act as a driver for innovation and change in school settings (McCharen, Song & Martens, 2011).

Despite these developments, it is acknowledged that the concept of creativity is complex and multifaceted and thus often difficult to define (Glaveanu, 2015; Amabile, 1996; Littleton et al., 2012; Lemmetty, 2020). Moreover, we lack a clear understanding of the exact mechanisms

whereby a culture supportive of creativity is elicited by a professional community and how new creative products emerge in collective creative activity. Hence, the existing research points to the need for further empirical research on collective (Sannino & Ellis, 2013) and distributed creativity (Sawyer & deZutter, 2009) and its connections to learning, a research gap we address in this study.

Drawing from the theory of expansive learning (Engeström, 2014; Engeström et al., 2015), we view work communities as creators of novel concepts and models of activity, enabling them to collectively transform their practices. This involves a cyclical process of epistemic learning actions through which, by moving from abstract to concrete, the community designs and implements the new concept for their work activity (Engeström, 2014). From this perspective, learning and knowledge creation are viewed as connected, both being about recognizing differences (for example, actors with multiple, differing perspectives) and opportunities for innovation (Virkkunen & Newnham 2013). Following this, creativity and learning need to be investigated as intertwined (Sannino & Ellis, 2013). Therefore, our research interest lies in not only individual creative acts, but also in the interactive creative process and "visibilization" of distributed creativity and expansive learning actions.

The aim of our study is to generate new research knowledge on distributed creativity and its connections to expansive learning. Drawing from socio-cultural theorizing, we define creativity as a distributed process, consisting of creative acts taken by interacting individuals (also Sawyer & deZutter, 2009). Further, taking an activity-theoretical stance, we perceive distributed creativity as socio-materially mediated by discourse and available tools and artefacts (Vygotsky, 1978; Engeström, 2014; Miettinen, 2013). Moreover, we conceptualize distributed creativity as taking place within collective activity that is object-oriented. From an activity-theoretical view, the object (e.g., for a teacher community, the students and their learning) is of crucial importance as it gives the community a long-term purpose and direction, holding it together (Engeström, 2008). However, as the object constantly evolves due to issues such as societal changes (such as a curriculum reform), tensions and contradictions can arise, and the need to transform the activity then emerges (Engeström et al., 2003). This calls for collective reconstruction efforts of the object via expansive learning, which may lead to the formation of a new, expanded understanding of the object and renewed patterns of activity oriented to the object.

The context of our study is a Finnish teacher training school, subjected to a demanding curriculum reform and in need of transforming its practice. To support the school staff, our research team carried out a workplace development effort called the Change Laboratory (CL) (see Virkkunen & Newnham, 2013) at the school, involving the teachers and their headmaster. As our research questions, we ask: 1) How creative acts emerged during the CL and 2) How the interactive creative process contributed to expansive learning.

To investigate the CL meetings, we created a method for analysing the emergence and evolvement of the process of distributed creativity. For this, we first depicted *creative acts* made by individual participants to which the others responded. We then traced how these acts accumulated in interaction into *creative leaps*, novel conceptualizations of the work activity mediating and facilitating expansive learning actions over the course of the CL process. In addition to analysing creativity in discourse, we directed our attention to socio-material mediation (Vygotsky, 1978; Engeström, 2014; Miettinen, 2013) and the actors' body postures and physical movement (see also Csikszentmihalyi, 1996; John-Steiner, 2000; Sawyer & deZutter, 2009). This enabled the depiction of the embodied actions and products generated during the creative process. Taken together, our analysis captured a dynamic interplay between the discursive and embodied creative acts, creative leaps and expansive learning actions towards the development of an entirely new concept of shared pedagogical leadership. Later in the Change Laboratory, this process materialized into a tangible new pedagogical leadership model for the school.

Our study contributes to the research connecting collective forms of creativity and learning. More specifically, it offers a novel analytical method for analysing and conceptualizing processes of distributed creativity in organizations. Further, our analysis adds to the research on expansive learning by linking the process of distributed creativity and expansive learning actions, to explain better how creative products may be designed collectively. Moreover, our findings could be useful for supporting educational change via collectively developed concepts and models of pedagogical leadership. Our study also informs teachers' professional learning and designing and conducting processes of work development within schools. Finally, our analysis highlights the facilitative role of activity-theoretical interventions in creative processes and learning in organizations.

Distributed creativity and expansive learning

In previous studies, creativity has been explored on many levels. Inspired by psychology and cognitive science, often applying psychometric approaches, the analysis of creativity has traditionally considered creativity to be a quality and mental property of individuals, or a novel outcome of an individual's action (see e.g., Amabile, 1996; Ekvall, 1996; West, 1990; Woodman et al., 1993; Sternberg & Lubart, 1999). Since the 1980s and especially during the 1990s, scholars started to move the research attention from individuals to the distribution of cognition across actors, artefacts/tools and the context and systems in which these operate (Hutchins, 1995; Salomon, 1993; Greeno, 2006; Sawyer & deZutter, 2009).

In the context of work, creativity is crucial for knowledge sharing, collaboration, achieving shared understanding (Ludvigsen & Nerland, 2013), and for the development of professional agency (Collin et al., 2017). Creativity can then be seen as a process (Glaveanu, 2011; Sawyer, 2004; Drazin et al., 1999), and as a problem-solving activity in which the participants use and introduce new knowledge resources (Segers et al. 2018). Furthermore, creativity is important for supporting organizational development, innovativeness and competitiveness, as creative outcomes include novelty and usability (Gruys et al., 2011; Kaufman & Sternberg, 2009). To this end, organizational culture supportive of learning and creativity can act as a driver for innovation and change (McCharen et al., 2011; Virkkunen & Newnham, 2013). Furthermore, studies connecting creativity and innovation make important contributions to the development of contemporary working life and organizations (e.g., Anderson et al. 2014; Schulz et al., 2017). Importantly, they also pay attention to the role of collaboration in creative processes and innovation generation.

Connecting different levels of creativity, and taking a multilevel and systemic view, Anderson and colleagues (2014) define creativity as consisting of four levels, namely the individual level (containing e.g. personality traits, orientation to learning, cognitive abilities, autonomy), group (e.g. the structure and composition of the group), organizational level (use of knowledge networks, organizational strategy and structure, material and immaterial resources) and integrative level (connections between the previous

levels, and various related aspects). More precisely, they define creativity and innovation in a work context as:

> "--- the process, outcomes, and products of attempts to develop and introduce new and improved ways of doing things. The creativity stage of this process refers to idea generation, and innovation to the subsequent stage of implementing ideas toward better procedures, practices, or products" (Anderson et al., 2014, p. 1298).

Drawing from a collectivist, sociocultural stance, Hakkarainen (2013) defines creativity as an object-oriented process, cultivated by shared knowledge practices of innovative knowledge communities and their networks. Creative achievements are hence viewed as transactive processes involving novelty, innovation, agency and the transformation of a network of mutually supporting actors (Hakkarainen, 2013). Scholars of cultural-historical activity theory, and the theory of expansive learning as its application to the context of work and organizations (e.g., Engeström, 2014), emphasize the object-oriented nature of collective activity. Focusing on collective processes of knowledge creation, they highlight that creative efforts are needed in order to generate learning and to produce novel and societally relevant concepts and outcomes (Engeström, 2011; Sannino & Ellis, 2013). This necessitates multiple actors and a dialogue among them, as well as tools and artefacts to support the collaborative process (Yamazumi, 2013; Engeström, 2008, Engeström et al., 2014). For example, some sociocultural studies conducted in educational settings show that creative learning environments within schools, which include a rich constellation of tools and artefacts such as collaborative technologies, digital tools and craft-based materials, can become powerful mediating devices for enhancing the students' creativity, knowledge creation and learning (Hakkarainen, 2009; Kajamaa et al., 2019; Kajamaa & Kumpulainen, 2020; Riikonen et al., 2020).

Previous research on collective creativity has also pointed out critical features that call for attention. It is well acknowledged that collective creativity is a complex phenomenon (Glaveanu, 2015; Amabile, 1996; Littleton et al., 2012), and it can involve personal and societal paradoxes (Lemmetty, 2020), struggles and tensions, as well as critical transitions in the complex efforts of learning (Sannino, 2013). Furthermore, the unpredictability of creative processes adds to the

complexity. For example, Sawyer and deZutter (2009, p. 82) state that "distributed creativity ranges from relatively predictable and constrained, to relatively unpredictable and unconstrained", stressing that the processes in which truly novel and unexpected things may collaboratively emerge tend to be relatively unconstrained. These unpredictable, shared creative processes closely resemble the process of expansive learning of "something that is not yet there" that takes place among a group of actors (Engeström, 2014), and we have thus chosen this approach as our theoretical lens.

A formative workplace intervention method based on the theory of expansive learning, the Change Laboratory (see Virkkunen & Newnham, 2013) provides its participants with research-based tools and a relatively unrestricted learning environment. The CL facilitates interaction, "multi-voicedness" and shared creative processes. It also allows for deviations from the script of the interventionist researchers facilitating the process, as well as from the scripts and ways of working of the participants in the activity systems under scrutiny (see Virkkunen & Newnham, 2013). Further, by definition, expansive learning is a collective process, aimed at overcoming tensions and potentially leading to the formation of a new, expanded and (at least partially) shared object of activity between the participants. In this, tensions and contradictions are seen as inherent features of organizational life and as potential drivers of change, learning and innovation creation (Engeström, 2014), and, in our view, also for the emergence of distributed creativity (Sawyer & deZutter, 2009). With the aim to generate new research knowledge on distributed creativity and its connections to expansive learning, we analyse these among a group of teachers with diverse opinions, during a demanding curriculum change calling for transformations in their work activity.

Study

Research setting

The school under study serves as a school for local children but also as a teacher training facility, its main tasks being teaching, research and supervision of pre-service teachers. Its aims also include developing high-quality teaching and curriculum planning to serve the national Finnish schooling system. The school comprises an elementary school (pupils aged 7 to 12), a secondary

school (13 to 15) and an upper secondary school (16 to 18) with nearly 1,000 students overall. The participants in the Change Laboratory were from the elementary school.

This school, along with other Finnish elementary and secondary schools, was facing transformational needs due to a curriculum reform. Implemented gradually from 2016, the new Finnish National Core Curriculum for Basic Education calls for enhanced collaboration, teamwork and distributed forms of practice from the teachers. One of the key objectives of the new curriculum is to promote the students' all-round development and lifelong learning through "transversal competence", a Finnish take on OECD's 21st century skills framework. To reach the new learning outcomes derived from this, the curriculum calls for integrative learning and interdisciplinary studying in schools, crossing the traditional boundaries of individual teachers' work (see also e.g., Engeström, 2008) and encouraging new forms of collaboration (Uljens & Rajakaltio, 2017).

In Finland, teachers typically enjoy a high degree of autonomy in planning and executing their own teaching as well as the evaluation of students and their learning outcomes (Sahlberg, 2011; Simola, 2015), within the boundaries set in the curriculum. Considered to be the best pedagogical experts in their work communities, teachers usually also take part in designing their school-specific curricula, building on the municipal curriculum and the national core curriculum. However, with the new national core curriculum's increased demands for collaboration in planning, teaching and evaluation, new forms of collaboration and shared working are required from teachers.

To meet these new needs better, a Change Laboratory (CL) workplace intervention process (see e.g., Engeström et al., 1996; Engeström et al., 2002; Kerosuo et al., 2010; Virkkunen & Newnham, 2013) was launched at the school. The CL was suggested to the headmaster by our research group. We were interested in how this school, supervising pre-service teachers and having special status in the Finnish educational system, responds to the curriculum reform. Participants in the CL were elementary school class teachers, special education teachers and the elementary school headmaster. Fourteen participants from the school took part in the CL, with between six and nine school personnel attending each meeting. Participation was voluntary, and the weekly meetings were held on the school's premises.

The CL is a participatory method, the aim of which is to help organizational actors to understand the systemic nature and the developmental needs of their daily activities. System-level organizational changes can be achieved through means of talk (Haapasaari et al., 2014; Sannino, 2008), by examining tensions and contradictions and developing new models and renewed work practices as a community (Engeström et al., 2007; Engeström et al., 2010). The process also aims to foster and guide the practitioners' collective, expansive learning and transformative agency. The CL interventions typically follow a series of epistemic learning actions – questioning, analysing, modelling, examining the model, and so forth – depicted as an expansive learning cycle (see Virkkunen & Newnham, 2013; also Engeström, 2014).

Data collection

To understand distributed creativity in our data better, it is important to direct research attention to the real-time micro-processes of creativity "in action" (see Sawyer & deZutter, 2009, p. 82). In the case of our study, this means six video-recorded CL meetings (see Table 1 below for details), serving as the primary data source for this chapter. The meetings were recorded using two video cameras on opposite sides of the meeting room and an audio recorder. For the most part, the data are very clear and of high quality. Minor shortcomings include occasional inaudible speech or it not being possible to name the speaker, especially when determining whether a speaker is a teacher or one of the researchers.

The video and audio data of the participants' interaction in the meetings were transcribed verbatim, resulting in 276 pages of transcription consisting of 4594 speaking turns. The transcriptions were used in the analysis, supporting the video and audio data.

Table 1 indicates the duration, number of speaking turns and attendees at the CL meetings. It reveals that towards the end of the process, especially in meetings 5 and 6, there were dramatically more speaking turns than in the first four meetings, implying shorter speaking turns and less silence.

	Duration	Number of speaking turns	New teachers	Senior teachers	Headmaster
Meeting 1	93 min	575	2	6	-
Meeting 2	103 min	564	1	7	1
Meeting 3	98 min	590	1	6	1
Meeting 4	95 min	592	2	4	-
Meeting 5	98 min	782	1	7	1
Meeting 6	93 min	1491	1	5	-

Table 1: Duration, speaking turns and attendees at the Change Laboratory meetings

A distinction was made between "senior" and "new" teachers among the participants (see Table 1), new teachers having worked at the school for less than a year. We considered this to be a useful grouping for the analysis, as the input by these groups for the creative process was rather distinct: senior participants drew heavily from their knowledge of the existing structures and issues of the school, while the newer teachers brought up their previous experiences from other schools as examples of good practices. This distinction was also driven by the teachers' eagerness to emphasize their backgrounds and work experiences at the beginning of the CL.

The transcribed excerpts, presented in the findings section, feature the following codes for the participants: senior teacher (ST), new teacher (NT), headmaster (PR), researcher (RR) and undefined person (U), replacing their names and accompanied by a running number. Other codes include unclear speech (---), interruption (#), overlapping speech (##) and speaking turn continuing or left open (…). Other recognizable details, such as names of persons not participating in the process and place names, have been altered for anonymity.

Data analysis

We set out to discover how creative acts emerged during the CL and how the interactive creative process contributed to expansive learning. In the analysis of our data, we used an iterative approach, which is an inductive form of analysis that "encourages reflection upon the active interests, current literature, granted priorities and various theories the researcher brings to the data" (Srivastava & Hopwood, 2009, p. 77). On this basis, the data were first approached by

viewing the entire video corpus (i.e., the six CL meetings) and then focusing on selected episodes of interaction in which we could witness the emergence of distributed creativity (Sawyer & deZutter, 2009) and actions and conceptualizations that would constitute expansive learning (Engeström, 2014).

In the three-step analysis of the data, we paid close attention to expressive and emotional aspects of interaction that are visible and audible in the video data but are not entirely carried over to the textual transcriptions, such as body postures, physical movement, gestures, nodding, seeking eye contact etc., to deepen our analysis and interpretations of the creative process (see also Csikszentmihalyi, 1996; John-Steiner, 2000; Sawyer & deZutter, 2009). We also focused our attention on socio-material mediation and production of tools and artefacts (see also Engeström, 2014; Miettinen, 2013; Kajamaa & Kumpulainen, 2020; Riikonen et al., 2020) during the creative process. We considered an interaction episode to have ended when the participants withdrew from the discussion topic. We also paid attention to who made the creative initiative and who took part in the interaction, distinguishing between participants and facilitators.

As the first step of our analysis, we analysed excerpts in which a participant made *a creative act,* meaning that an individual verbally proposed an original initiative to which other participants responded with new creative acts, building interaction around the proposed subject of discussion. As cues to coding the creative acts, we typically found in the data a sudden change of subject, interruption to take the floor, introduction of an out-of-the-box idea or commencing a physical activity such as drawing a tentative model. However, not all initiatives resulted in creative interaction and creative products, but looking at the data *post hoc*, we could focus on the initiatives that eventually lead to fruitful interaction. Such episodes typically had "an unpredictable outcome, rather than a scripted, known endpoint" (Sawyer & deZutter, 2009, p. 82).

During the analysis, we soon noticed that the multiple consecutive creative acts typically accumulated in the interaction over the course of the CL meetings, resulting in novel, shared conceptualizations of the work activity which we call *creative leaps*, forming the second step of our analysis. In examining the incremental formation of these conceptualizations, our attention was focused on tracing and identifying aspects of the interaction in which the participants

furthered collective knowledge-creation, such as seeking eye-contact and nodding as a sign of appropriation or leaving one's speaking turn "open-ended". By this, we mean not ending one's turn with an assertive tone, but rather slowing the pace towards the end of the turn, leaving sentences unfinished, providing others with room to talk, and simultaneously using extralinguistic means to invite others to continue the creative process.

As the third analytical step, we analysed the data for expansive learning actions – namely the participants' collective actions of 1) *questioning* the current work practices, 2) *analysing* tensions and contradictions in the work activity and 3) *modelling* a new solution for transforming the work activity (Engeström, 2014) – that by the end of the CL process led to collective creation of a new pedagogical leadership model. *Modelling* here is viewed as an especially pivotal learning action in terms of the creation of the tangible creative product, and thus much of our analytical attention and reporting of the findings focuses on this learning action. In this context, *modelling* means articulating the discovered explanatory relationships in a simplified model of the new idea that offers a solution for the problem, for example (see Engeström, 2014). When examined in conjunction with expansive learning actions, *creative leaps* were found to coincide with the progress of this collective learning process. A creative leap thus was found to act as a mediating intermediate concept between an action (*creative acts*) and activity (expansive learning).

Findings: Distributed creativity and expansive learning in the Change Laboratory

In this section, we present the findings resulting from our analysis of the Change Laboratory meetings. We decided to focus our presentation on findings from the third and sixth meetings, as the third meeting marked a turning point when the group began moving towards conceptualizing and modelling the new pedagogical leadership model, which took a concrete form in the sixth meeting. Further, it was not before the third session that the group began to exhibit characteristics of distributed creativity; in other words it was when the *creative acts* and *creative leaps* emerged. Notably, there was a dramatic increase in the number of speaking turns in the sixth meeting (see Table 1 above) as the group became more aligned to a creative mindset, and the modelling intensified. Our analysis also suggests that the members of the group became more comfortable with the process, had more trust in each other and the facilitating researchers, and

were increasingly willing to express tentative ideas that would be either overridden or built on further in the ensuing interaction.

Interaction episode 1: Searching for the shared object of the collective activity

The first two meetings of the Change Laboratory process had involved a lot of questioning, criticizing and rejecting some aspects of the current, historically evolved practices and the existing wisdom. This can be interpreted as an expansive learning action of *questioning* (see above). By the third meeting, the participants had reached agreement that the school was lacking a common vision to support the teachers in carrying out their core activities, namely teaching, pre-service teacher supervision and research. This need for a vision was amplified by the changes brought about by the new national core curriculum and its effects on the school's own curriculum work. To note, the headmaster was present at this meeting.

So far, the concept of "pupil" had not surfaced in the meetings, as the teachers had been discussing the tensions and struggles they experienced related to their own work, as well as broader organizational and leadership issues of the school. This interaction episode illustrates how, after about 40 minutes into the third CL meeting, the researchers introduced the notion of "pupil" to direct the discussion towards *analysing* the situation and moving towards resolving the challenges and tensions. The following excerpt demonstrates how the researcher's (RR1) introduction of the notion of pupils triggered what we interpret as the initiating creative act of this episode, that is a proposal initiated by a senior teacher (ST6) for a potential common vision for the school.

> *1215 RR1: --- The idea here has been, like you mentioned, that it would be good to have some common goal or common object, so it would be somehow more like that forest [than just the trees], or to have this kind of framework, [---] could it be some sort of common thing to help you, make it more flexible, easier to work with the pupils.*
>
> *1218 ST6: Just to make something up, for example social justice, or acknowledging the society in schoolwork. I think those could be…*
>
> *1219 ST3: Those are, like, wider concepts.*
>
> *1220 ST6: I could be wrong --- but I think those are the kinds of...*

1221 RR1: Yeah.

1222 ST6: common goals.

1223 ST3: Yes, yes!

1224 RR1: Right, ST6, this is just what we are after with this [discussion], answers, these kinds of answers.

1225 ST6: Yeah.

Although the proposal was not meant to be an actual suggestion for a common vision, the researchers and other participants took it as such, altering the interactional effect of the proposal. This illustrates the contingency of the creative process (Sawyer & deZutter, 2009) through which consecutive creative acts alter the meaning of the earlier acts.

1264 ST6: Please note that I didn't suggest it as a common object, but I just gave an example of the level of abstraction that could be..

1265 U: ## Yeah, yeah. Right, yeah.

A second creative act emerged as another senior teacher (ST9) proposed the contents of the new curriculum as a potential common vision. However, the participants soon realized the difficulty of finding answers to their current transformational needs from the rather normative curriculum document, as illustrated in the next excerpt.

1292 ST9: Is there something in the new curriculum that would be such ---

1293 ST6: Well, there are those, transversal competencies are in there, seven of those.

1294 ST9: Right. So, would one of those be such a thing then?

1295 ST6: You can't highlight just one. So, we must in any case strive for those, because they are stated in the curriculum.

1296 ST2: They are norms.

After a brief discussion on the new curriculum, senior teacher ST3 made the third creative act, proposing the notion of the children's future. This elaboration of the initiatives proposed earlier – the pupil, the society and the curriculum – synthesized them

into a collective proposal for a shared object of activity, now perceived by the participants as children learning to function skilfully and successfully in the future society.

> *1313 ST3: I was thinking that when ST6 mentioned that acknowledging of the surrounding people society [sic], so aren't all those transversal competencies somehow related to how the child can then cope, will survive, what kinds of skills they need in order to function in that society of the future?*
>
> *1314 ST6: Yeah, because they are all parts of the transversal competence.*
>
> *1315 ST3: ## Yeah, yeah.*
>
> *1316 ST6: All the teaching subjects rely on developing those.*
>
> *1317 ST3: ##Yes, yes, yes. – So, could that be made into a common thing like that?*
>
> *1318 RR2: How the child copes.*
>
> *1319 ST3: Yes.*
>
> *1320 RR1: What kinds of skills does the child get for functioning in the society.*
>
> *1321 ST3: Yeah, that exactly.*

In terms of expansive learning, this first interaction episode can be described as constituting a qualitative, expansive transition from a need for change, to conceptualizing the shared object of activity (Engeström, 2008). Further, we consider this to be crucial from the viewpoint of *questioning* the current practices. It is also an important step in moving towards the expansive learning action of *analysing* the current situation (Engeström, 2014). The excerpts presented in this first interaction episode illustrate a succession and accumulation of three *creative acts*, with several features associated with the emergence of distributed creativity: changing the interactional effect of an act by subsequent acts, contingency in which consecutive creative acts depend and build on one another, and collaboration through which each participant contributes equally (Sawyer & deZutter, 2009). As a result of this interaction, *a creative leap* was formed when a rather unexpected outcome, namely a proposal for a shared object of activity for the school, emerged, contributing to the expansive learning of the CL participants.

Interaction episode 2: Envisioning a dynamic team model for pedagogical collaboration

The fourth CL meeting focused on collectively *analysing* the historical development of the teacher training school and identifying the main tensions of the current activity system derived from historical reasons. Then, the fifth meeting was already foreshadowing the *modelling* process depicted below, with discussions around the possible team structures and the teams' role in the school's pedagogical leadership.

In the latter half of the sixth meeting, consensus among the CL participants had been reached that, to enhance pedagogical collaboration, teacher teams divided by grade level were considered essential for designing the school's local curriculum, building on the new national core curriculum. However, the development work of the school's research, pre-teacher supervision and teaching duties were not seen to fit this kind of grade-level division. Despite this, the participants began to design a model based on grade-level teams. What we consider to be the initiating creative act of this episode, the first draft (see Figure 1) of the team-based leadership model was drawn by senior teacher ST5, summarizing the jointly developed ideas so far. To note, the headmaster was not present at this meeting.

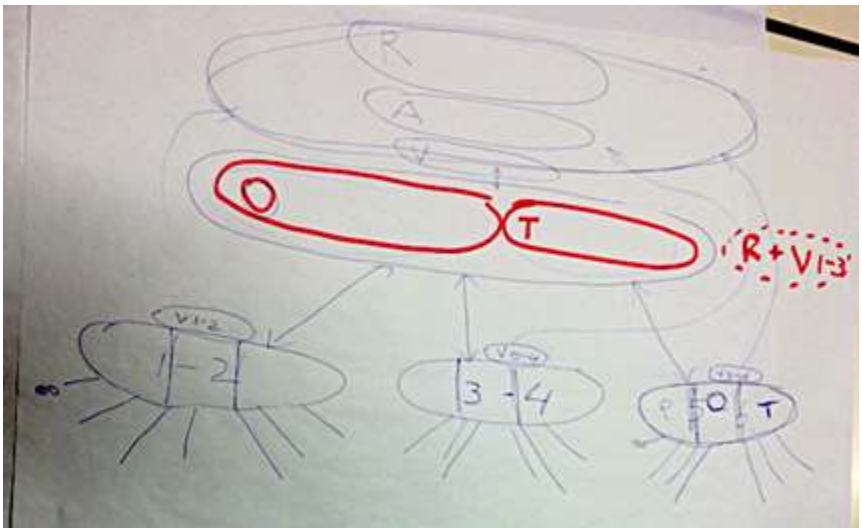

Figure 1: Photograph of the first version of the new model, drawn by the teachers

As demonstrated in the following excerpt, the participants then quite critically reflected on the first model, (Figure 1) criticizing it as a traditional-looking top-down organizational model with

the headmasters at the top of the hierarchy. This triggered a second creative act made by new teacher NT1, suggesting a novel idea that the model might be based on a ring shape. Senior teacher ST6, who had opposed the previous hierarchical model, then voiced his support for this idea, and encouraged NT1 to start drawing a ring-shaped model.

3537 NT1: I also was thinking that is it… that this is now like a hierarchical model, which is then…

3538 ST6: # It is a military model.

3539 NT1: It's not logical, easy to understand.

3540 ST5: But didn't we… did we discuss a thing like this? Have we discussed this?

3541 NT1: ## But I mean could it be in the shape of a ring?

3542 ST3: I think we have been discussing that kind of ---

3543 ST5: ## Yeah, because I think we need to talk…

3544 ST3: # My idea from last time was that sort.

3545 ST5: Right.

3546 ST3: But I mean now we could take a totally...

3547 ST5: Right.

3548 ST6: Draw a ring, let's do it this way! [giving paper to NT1]

As the sixth meeting progressed, the ring metaphor was expanded with various new attributes, such as the sun, a dartboard, a shooting target and a doughnut. When discussing the possible new versions of the model, there was a lot of talking over each other and laughter, indicating that the group had transitioned into a more creative mode of collaboration (see Engeström et al., 2015). We also view this shift as a collective effort to break traditional school hierarchies and to create a space in which everybody was free to voice their ideas.

In the next excerpt, as the third creative act, we illustrate how senior teacher ST6 then introduced the concept of having grade-level teams and function-specific teams (for

research, supervision and teaching) side by side in the model. This idea was triggered by the ring-shaped model which at this point functioned as a shared socio-material mediator, mediating the discussion and continuation of the drawing activity.

> *3564 ST6: So, how about having these [teams] on the circle, so that some of them are divided by age, but then there would also be functional ones. The doughnut would look like this. [starts drawing a new picture]*

Figure 2 presents "the doughnut model" drawn by senior teacher ST6 with grade-level teams (1–2, 3–4 and 5–6) and function-specific teams (teaching, supervision and research, left to right), in later iterations replaced by a division by class letter (A, B and C) or school building floor (1st, 2nd and 3rd).

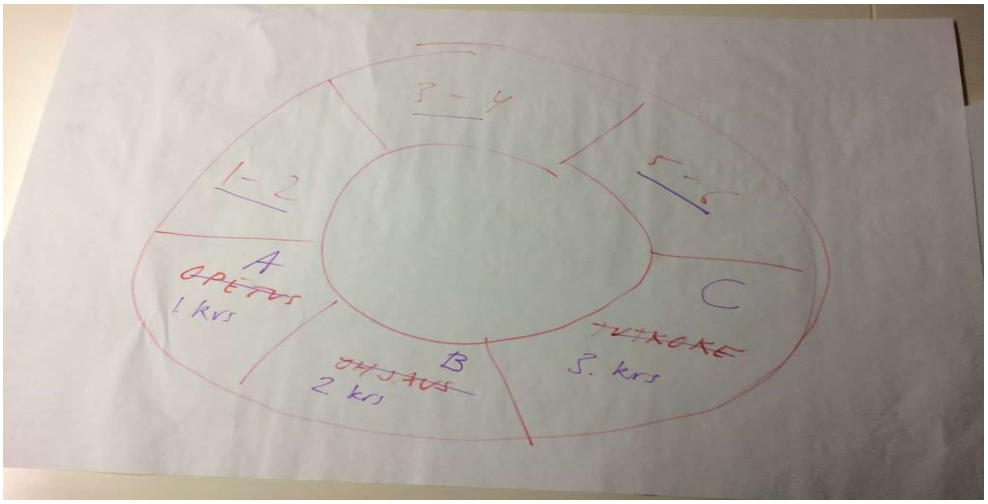

Figure 2: Photograph of "the doughnut model" initiated by senior teacher ST6

In the ensuing, fast-paced co-planning of the future division of labour, a team segmentation was created that would later end up in the final model. As illustrated in the following excerpt, new teacher NT1, building on ST6's idea, made the fourth creative act of the episode, presenting an idea that the teachers could work flexibly in either grade-level teams or function-specific teams.

> *3575 NT1: [---] …then there would be a research group, a supervision group and a teaching group.*
>
> *3576 ST6: Yes, these three.*

3577 NT1: So, we would in fact have six teams. We operate either this way or that way [showing different directions across the "doughnut"].

3578 ST6: ## Well, there you go!

3579 U: Yes, yes.

In terms of expansive learning, this second interaction episode illustrates the participants alternating between the epistemic learning actions of *analysing* their current work activity and *modelling* the new solution (see Engeström, 2014). In this episode, the four consecutive *creative acts* accumulated into a *creative leap*, accelerating the expansive learning process, and the collective formation of a new concept (Engeström et al., 2015) for organizing pedagogical teamwork in a dynamic way. The distributed creative activity in this episode began with ST6's resistance of hierarchies and "military-like" models and materialized in a dynamic circular model that would allow flexible work practices. As in the first interaction episode (from the third meeting), the interaction presented in the second episode (from the sixth meeting) also illustrates a succession of *creative acts* with several features associated with the emergence of distributed creativity (Sawyer & deZutter, 2009). The dynamic model (Figure 2) that emerged as a result of the *creative leap*, described herein, offered a tentative solution for the contradiction of differing requirements for teamwork between curriculum work and developmental work (i.e., research, supervision and teaching), acting as a starting point for the creative activity in the next interaction episode.

Interaction episode 3: Inventing a dynamic model for pedagogical leadership

When just over an hour of the sixth meeting had passed, in the middle of a conversation about the teams' role in the school's pedagogical decision-making, new teacher NT1 spontaneously started drawing a new model, constituting the first creative act of this episode.

3820 NT1: So, this thing, that if there are now all the headmasters here in the middle, if we wanted to be around them, then here would be the team leaders, these three, these ones.

3821 ST5: Right, would it be called a steering group, or what shall we call it?

3822 ST3: ## Yeah, steering group.

3823 N: Yes.

NT1 then drew teachers to be situated on "the ring" outside the steering group, divided into teams A, B and C, as per ST6's earlier suggestion. In her vision, each team would move on the ring depending on the subject it is dealing with. Functions (teaching, supervision and research) and grade levels (1–2, 3–4 and 5–6) were drawn as separate units outside the circular model. However, there was no clear idea of how the division of teams by class letter (A, B and C) would fit the functions and grade-level tasks. As shown in the next excerpt, the speaking turn ended up in wavering, with extralinguistic signalling to others to continue the thought process.

3841 NT1: ...see, these Bs are moving here like this.

3842 ST3: ## Okay, so they are moving entirely, right.

3843 NT1: So, here would be the grade levels, and here would be the teaching, supervision and research. [writing outside the circle model] So then, we could meet either in these teams or these teams. And then there would be the teachers' meetings, and then these Bs are revolving around here according to whether they are here in the 1–2 grade team, or if it is the one responsible for supervision, then it leads this team. So, these all have, like, two, it's schizophrenic when they must have two perspectives in that sense.

This triggered the second creative act by senior teacher ST5, who started drawing an alternative model consisting of multiple rings, with no "class-letter teams". NT1 then joined the creative process, mediated by the new version of the model (see Figure 3).

3844 ST5: I thought you were drawing this kind of thing, where here would be the steering group and headmaster, or headmaster and steering group, and here would be the team leaders. [drawing rings, and new rings around them]

3845 NT1: Yeah.

3846 ST3: I thought that too. Then the next step ---

3847 ST5: ## I thought this would become this kind of model that starts to grow. [drawing more rings]

3848 NT1: ## You could put it there! You could put the teachers in like this.

3849 ST5: Yes.

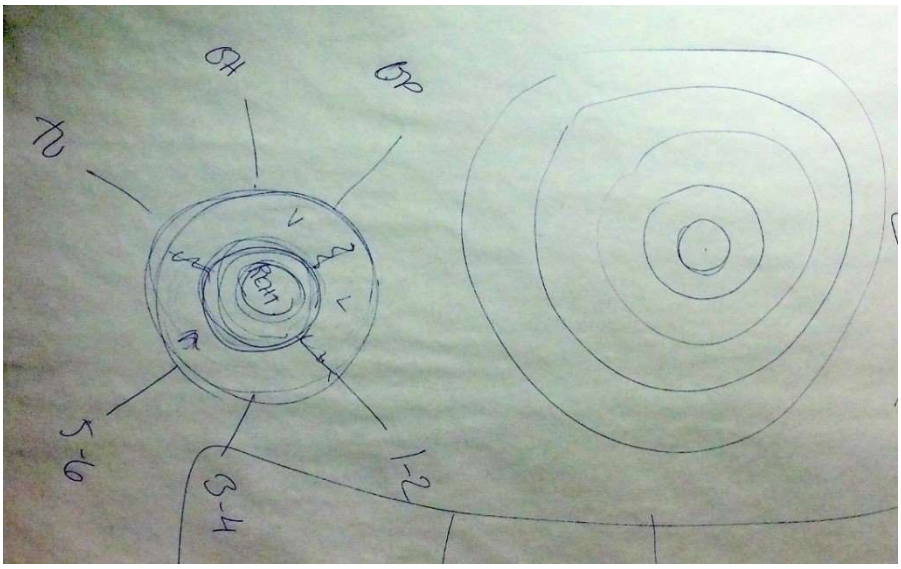

Figure 3: Photograph of further iterations of the model drawn by NT1 (left) and ST5 (right)

The researchers did not take part in the drawing process. However, at this point, RR1 made the third creative act of this episode by pointing to the models (Figure 3) and suggesting combining ST5's idea of a circularly unfolding model with multiple rings with NT1's idea of a job description of a team moving dynamically on the ring according to their task (a metaphor for a compass needle). ST6 invented the name "compass model" from the term "pedagogical compass" first uttered by the researcher.

3850 RR1: Is that a bit like a pedagogical compass then, so that it is, like, dynamic. So, it won't be like this [gesturing up-down-movement], but instead it moves like this [gesturing a circulating movement].

3851 ST5: Yes, then we…

3852 RR1: Isn't that what you were after there, ST6?

3853 ST5: Oh, yeah.

3854 ST6: Compass model, it is a compass model.

3855 ST3: A compass.

3856 ST5: Now we're on the map!

3857 RR2: There's some paper then, let's draw a big compass! ST6, draw a bigger compass right there.

In terms of expansive learning, this third interaction episode represents the epistemic learning action of *modelling* a new solution, as well as first steps towards *examining the model* (Engeström, 2014). As in the first and second interaction episodes, the excerpts from the third interaction episode also illustrate a succession of *creative acts* with several features associated with the emergence of distributed creativity (Sawyer & deZutter, 2009). This episode, with simultaneous drawing of models by the three participants, constituted the final *creative leap* of the Change Laboratory process, articulating the essential operational ideas of the new leadership model. After this, the sixth meeting ended with collaborative drawing of the final version of the model, which incorporated the novel ideas jointly created by the participants during the CL. The meeting thus generated a tangible creative artefact, a new pedagogical leadership model for transforming the collaborative work practices in the school community. The final model was named the "Compass model for distributed pedagogical leadership" by one of the participants.

Discussion and conclusion

In our chapter, we have been motivated to widen the understanding of distributed creativity and expansive learning in the context of a teacher training school. We investigated how creative acts emerged in the interaction during a Change Laboratory (CL) process and how the interactive creative process contributed to expansive learning. We explored creativity as a socially-distributed process taking place in the interaction of a group of individuals participating in the CL. For viewing creativity and learning through the lens of sociocultural theorizing and activity theory, a fruitful starting point was to examine a heterogenous and "multi-voiced" group of professionals, consisting of both experienced teachers, a school headmaster and new teachers. In this research setting, properties of individuals or attributes of creativity were not the focus of scrutiny. Instead, we were interested to investigate how the CL participants contributed to the interactive process by which distributed creativity and expansive learning of "something that is not yet there" took place.

Our findings illustrate how creativity and novel creative products emerged as a result of a collective interactive process. In the process, we discovered multiple sequences of *creative acts*,

innovative initiatives to which other participants responded, accumulating over the course of the CL meetings into what could best be described as *creative leaps*. This process involved interaction in which the ideas discussed were developed into novel shared conceptualizations of pedagogical collaboration and leadership, contributing to the group's expansive learning. Towards the end of the CL, the creative process materialized into a tangible artefact, namely a new pedagogical leadership model for transforming the teachers' collaborative work practices.

While the theory of expansive learning is well-suited to explaining systemic, collaborative learning, activity-theoretical studies focusing on creativity are rare. Our chapter responds to this need by providing new knowledge on the micro-level processes of distributed creativity contributing to the process of expansive learning. In line with previous studies showing that a culture supporting creativity and collaboration are pivotal for fostering professional learning (e.g. Cordova et al., 2012; McCharen et al., 2011), our findings confirm that a participatory method, such as the Change Laboratory, can aid building such a culture. Moreover, resonating with previous research exploring CL meetings (e.g. Haapasaari et al., 2014; Kerosuo et al., 2010; Sannino, 2008), our study demonstrates how it is possible to create new concepts and models of activity through means of talk and socio-material mediation, to achieve system-level changes in organizational activity.

The CL process was carried out in six consecutive sessions, and it was not before the third session that the group began to exhibit characteristics of distributed creativity. The first key moment for this creative process to emerge, described in the first interaction episode in our findings section, was a shared agreement about a vision or a broader purpose for the school. In light of expansive learning, this relates to the reconceptualization of the object of activity which, when connected to the need states expressed earlier, "gains motivating force that gives shape and direction to activity" (Engeström, 2008, p. 89). The emergence of the shared object then enabled the group to move from discussing tensions and challenges to start jointly envisioning a new model for pedagogical collaboration. Thus, the first interaction episode can be seen as a springboard (Engeström, 2014) for a creative process in which the modelling of a new collaborative pedagogical practice eventually took place. The second and the third interaction episodes, described in our findings, exemplify the further steps of the expansive learning process,

driven by the processes of distributed creativity, and the materialization of the discussion into a dynamic model of shared pedagogical leadership, drawn by the teachers.

In conclusion, our chapter contributes to the understanding of creativity as an object-oriented and distributed process, including tensions and innovation creation, manifested in the multifaceted interactions within a group of people. We have also discussed the role of creative processes in expansive learning, contributing to and intertwined with the epistemic learning actions of *questioning*, *analysing* and *modelling* in the cyclical process of expansive learning. As a methodological contribution, this study proposes *creative leap* as an intermediate mediating concept between *creative acts* found in interaction and expansive learning. Further, our results suggest that, as a participatory interventionist method, the Change Laboratory can be a useful tool for eliciting creativity and collaborative work development in schools as professional contexts.

There are limitations to this study that require consideration. Our analysis needs to be seen as our first step towards developing an activity-oriented "grammar" of distributed creativity in connection to expansive learning, and the ideas presented in this chapter require further investigation as well as theoretical-methodological elaboration. Further research attention could be directed to longitudinal investigation of the development of individuals' creative, agentive actions over time. Also, how collective creative processes connect to learning and contribute to the development of a workplace culture calls for further investigation. Further research is also needed to improve understanding of the role of leadership, both in individual leaders and as a distributed phenomenon, in fostering creative practices and expansive learning within a community.

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