CAPACITY BUILDING IN MULTILINGUAL SCIENCE CLASSROOMS: A FRAMEWORK FOR COLLECTIVE EXPANSIVE LEARNING

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بناء القدرات في فصول العلوم متعددة اللغات: إطار للتعلم الجماعي التوسعي

صوما بوجودة

الجامعة الاميركية في بيروت

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Introduction

- Providing quality science teaching in complex multilingual settings is no easy feat due to interrelated multi-layered aspects such as changing community needs, policies, and equity issues.

- Educational systems challenged by meeting diverse learners' needs have to develop new values and knowledge that may not be known in advance.

Context of the Study

- Teaching science in Lebanon

- Language policy

- Languages spoken in the science classroom

- Implications to student performance

Capacity building must respond to needs

- Sustainable capacity building in complex systems that leads to school culture transformation must respond to real needs of teachers, students, schools, and at times the broader educational system.

- It requires needs assessment of interrelated micro and macro aspects in multilingual science classrooms.

The need to look beyond teaching situations

- Despite a broad recognition of the pivotal role of teachers in improving student learning; within complex systems, there is also a need to "look beyond the teacher to the teaching situation itself" to identify particular and 'situated' capacity building needs of teachers *and* schools

Capacity building encompasses PD and school culture

- In complex settings educational capacity building is essential for sustainable change in system and individual practices

- This capacity building encompasses not only teacher professional development (PD) and learning, but also collective learning within the school culture as whole.

Proposed framework

- We propose a framework for needs-assessment, capacity building and potential action based on:

    - Cultural Historical Activity Theory (CHAT)

    - Engeström's expansive learning cycles

A Bakhtinian perspective and cultural historical activity theory (CHAT) for Understanding Multilingual Classrooms

Bakhtin's dialogicity and socially typifying language affords *micro* level analysis of classroom interactions
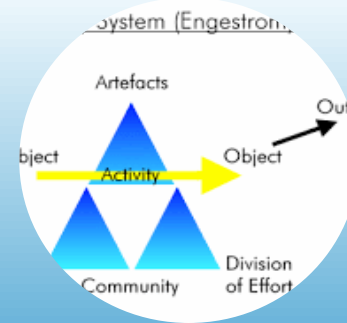

CHAT illuminates *micro* aspects of multilingual science classrooms as a collective activity within *macro* historical-cultural-social contexts

Emergent Contradictions from CHAT inform PD and capacity building

نظرية النشاط الثقافي التاريخيCHAT

- CHAT is a framework that integrates micro and macro aspects of an organized activity.

- Aspects of an activity system are *Subject*, *Object*, *Outcome*, *Instruments*, *Community*, *Division of Labour*, and *Rules*

- With changing contexts and needs, contradictions may arise among different aspects of an activity system.
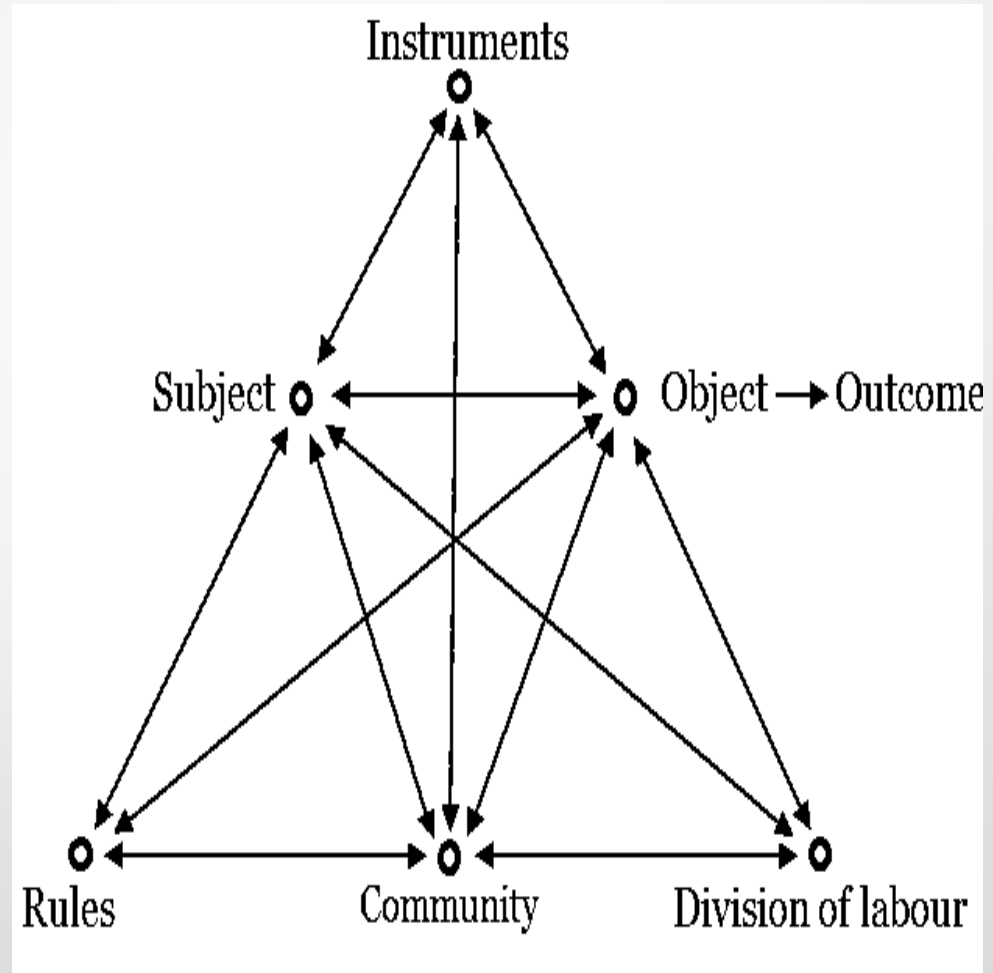
Expansive learning

- Expansive learning within activity systems refers to processes in which an activity system resolves pressing internal contradictions by constructing and implementing qualitatively new ways of performing

- Expansive learning is **non-linea**r, transformative, and **collective** and occurs when "learners are involved in constructing and implementing a radically new, wider and more complex object and concept for their activity"

Expansive learning

- According to Engeström and Sannino even as internal contradictions are necessary for initiating expansive learning, they are not sufficient; rather contradictions become an engine for expansive learning when the system identifies a new expanded object and the new objects turn into motives.

Expansive cycle

An expansive cycle or spiral would consist of an ideal-typical sequence of epistemic actions ascending from abstract to concrete

1. ***Questioning***: Questioning existing practice and wisdom

2. ***Analysing****:* Finding explanatory schemes

3. ***Modelling****:* Devising a model to find solutions to the contradictions

4. ***Examining model****:* Model is tested to understand its operation, potential and limitation

5. ***Implementing the model***

6. ***Reflecting on the model***

7. ***Evaluating process****:* New forms of practice are established.

Complementing Practical Impact and Rigorous Analysis

Fig. 3. Sequence of learning actions in an expansive learning cycle (Engeström, 1999b, p. 384).
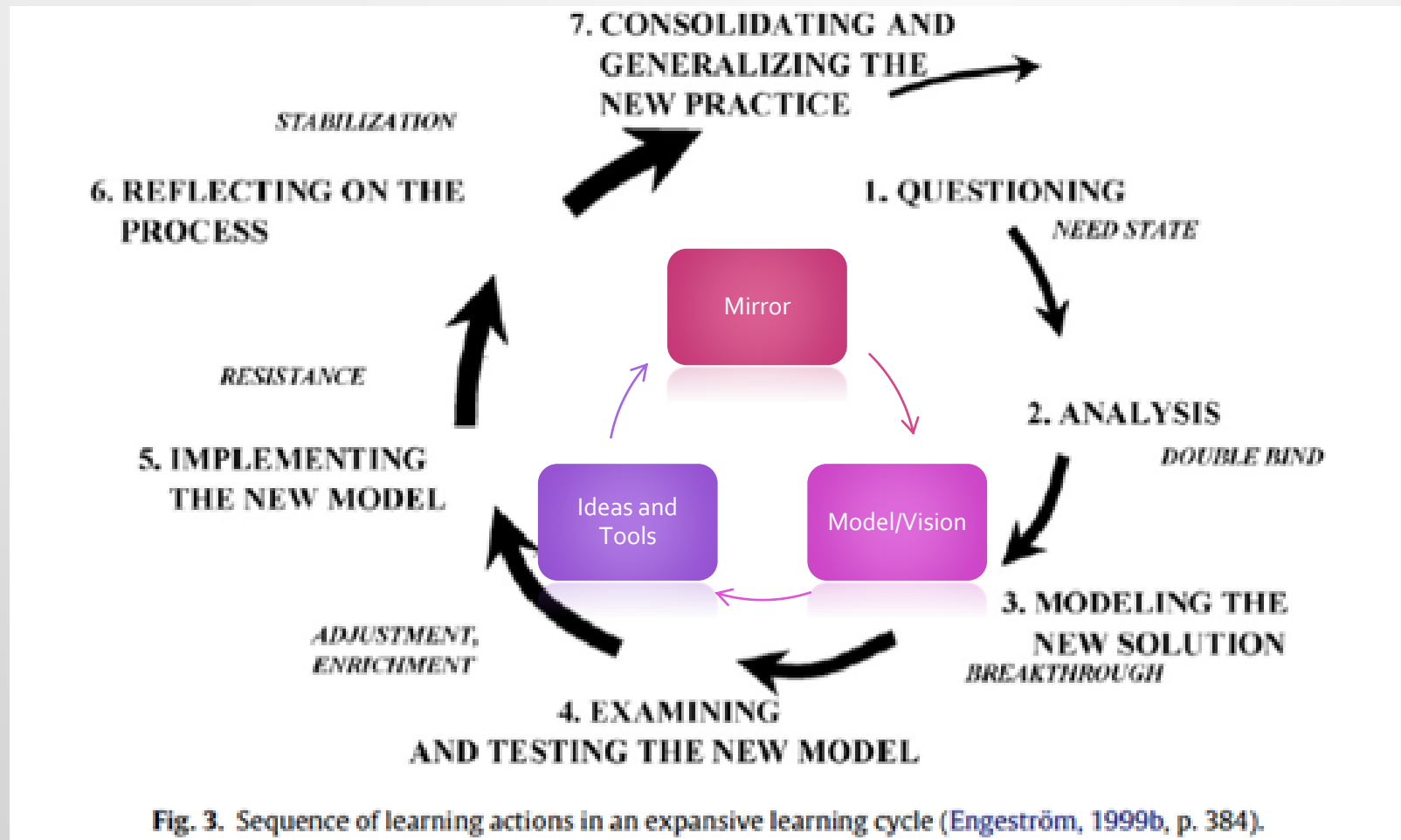
Bakhtin's Dialogic Perspective

- Language and meaning-making are socially negotiated and dialogically based:

  - Utterances are part of a chain of communication

  - They respond to previous utterances and anticipate others

Purpose of the Study

- Outline the preliminary actions taken to set the grounds for initiating an expansive learning cycle in the Lebanese context around issues of teaching science in a foreign language.

- Demonstrate the development of an integrative analytical framework that analyses actual-empirical relevant micro and cultural macro aspects of language issues in multilingual science classrooms and construct a picture of its inner systemic questioning, relations, and contradictions.

Purpose of the Study

- We then present a *model* of correspondence between contradictions and needs addressed by the analytic framework and capacity-building activities likely to initiate expansive learning (Action 3).

Research questions

- Our preliminary epistemic actions addressed the following questions:

  1. What contradictions emerge within the activity systems of different multilingual science classrooms and how can we describe them?

  2. How can contradiction types inform capacity-building needs and motivate expansive learning?

Methods

- Data sources were classroom observations, videotaped science lessons, semi-structured teacher interviews, student focus groups, and classroom instructional materials from five intermediate level school science classrooms of varying SES levels.

Methods

First level data analysis involved using Bakhtinian dialogism to discern speech genres, levels of conceptual learning, and multilingual language practices in science classrooms.
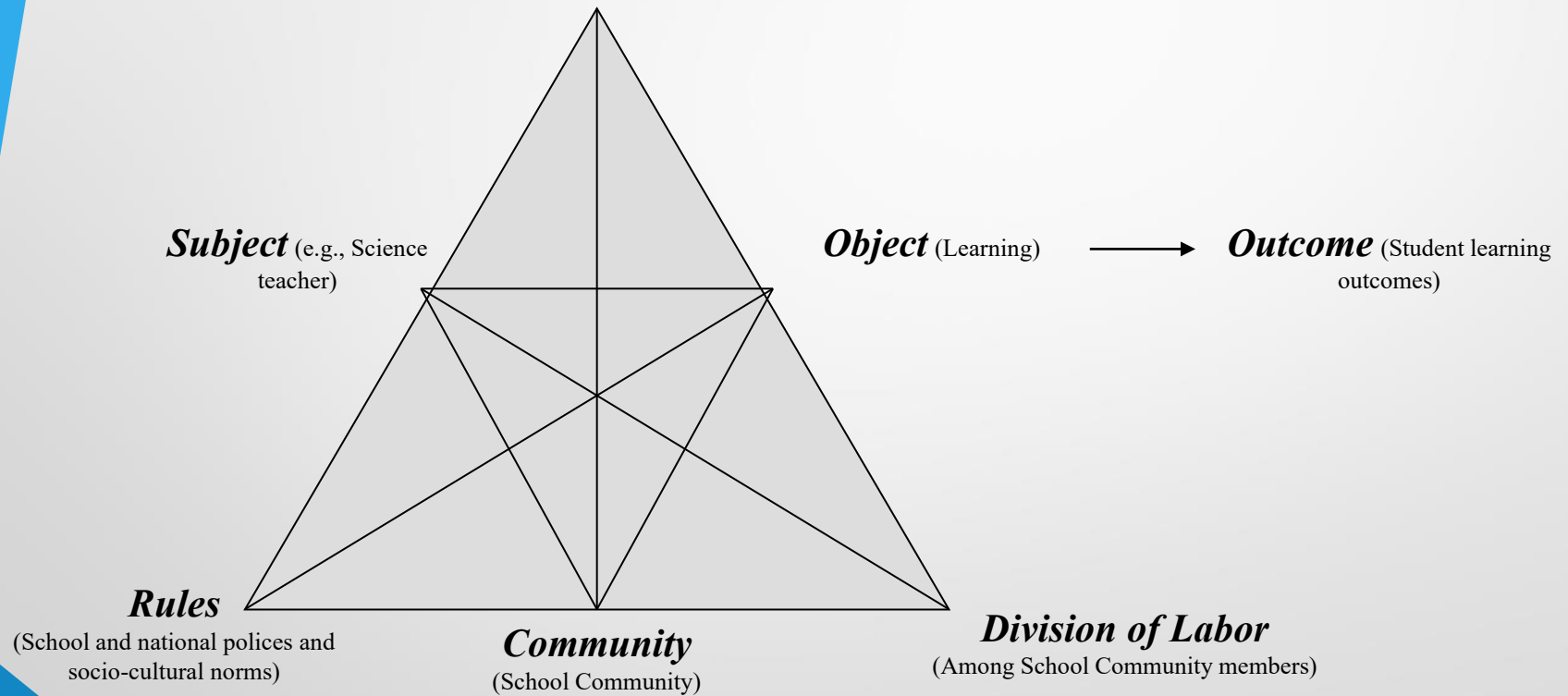
Second level data analysis explored teachers and students' meaning making of language practices and language-in-education policies to identify *subject* and *community questioning* within the system.

Methods

- We then depicted multilingual science classroom interactions as activity systems to construct a picture of inner systemic questioning, relations, and contradictions

The classroom as an activity system

Mediating Artifacts (Material, resources and symbolic tools)

Subject (e.g., Science teacher)

Object (Learning) ⟶ **Outcome** (Student learning outcomes)

Rules
(School and national polices and socio-cultural norms)

Community
(School Community)

Division of Labor
(Among School Community members)

Rural Private School

Symbolic Tools: Global Language
- Communicative approach
- Content: Expression and Comprehension
- Action Verbs used in national exams
- Textbooks
- Interactive whiteboards

Science Teacher

Learning chemistry content & passing
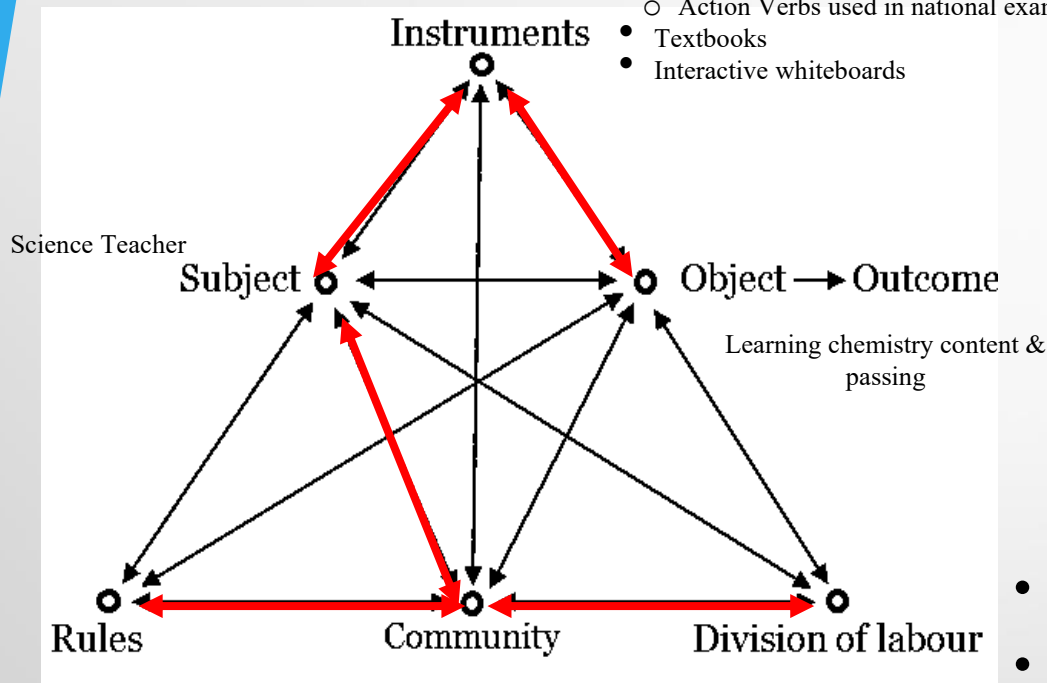
Predominance of Factual Knowledge

- Language-in-Education Policy
- School rules & policy on language use

- Students: Lebanese
- Teachers
- Coordinator
- Principal
- Parents

- Students: Prepare, study, learn content & new terms
- Science teachers: Prepare lessons for learning; prepare students for exam
- Coordinator: Check covering of curriculum and teaching methods
- Principal: checks implementation of language use policy and test scores- Parents: Help with homework
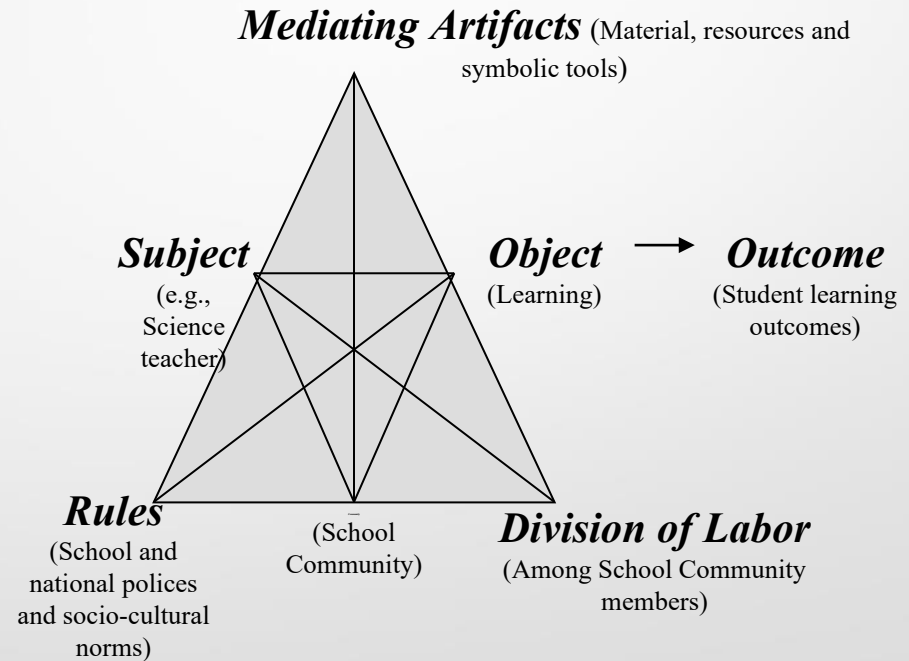
CHAT

❖ CHAT provides conceptual tools for understanding:

- Interactions in multilingual settings

- Multiple perspectives on practices and policies

- Networks of interacting activity systems

- Dialectical tension or contradiction within systems.

❖ Contradictions are resolved by individuals ***transforming*** social realities and themselves through an ongoing culturally and historically situated process (Engeström, 1993; Engeström, 2001; Roth & Lee, 2010).

❖ Hence, relevance of framework for capacity buildings

A model of correspondence

- Based on the analyses of science classrooms' activity systems, we developed broad categorizations of contradictions and considered capacity building activities that would be required within a simplified observable model.

- Based on data, we depict two levels of capacity-building: on the subject or teacher level and on system level expansive learning.

A model of correspondence

The upper triangle in CHAT involves the **subject's** _use_ of **Instruments**/**tools** to realize a certain **object** (e.g., how teachers deployed home language and other modalities and types of ensuing learning).

Mediating Artifacts (Material, resources and symbolic tools)

Subject
(e.g., Science teacher)

Object
(Learning)

→ **Outcome**
(Student learning outcomes)

Rules
(School and national polices and socio-cultural norms)

(School Community)

Division of Labor
(Among School Community members)

A model of correspondence

- Table 1 outlines the contradiction types encountered within aspects of upper triangle in CHAT.

- Contradictions involving awareness and disposition of *subject* towards *instruments* and *mediating artefacts* and how and what *instruments* they use would require purposeful and engaged professional development and building capacity for change of the *subject* or science teachers in multilingual settings.

Table 1. Contradictions in upper triangle Activity Systems

What instruments are used (or not used) by subject to realize object (e.g., home language)	How are instruments used by subject to realize object (e.g., interaction whiteboard for surface learning)	Awareness about instruments (e.g., active literacy strategies)	Disposition towards use of instruments (e.g., should home language be used?)	Availability of instruments (e.g., clear textbooks)

Building SUBJECTS' capacity: Teacher Professional Development

A model of correspondence

- Such teacher capacity building would involve teachers examining their classroom's activity systems to explicitly reflect on and question predominant values and perspectives and existing practices, and for collective inquiry for developing new instruments

A model of correspondence

Aspects encompassed beyond upper triangle activity system, e.g., *Rules*, *Community*, and *Division of Labour,* involve contradictions that go beyond the *subject* to the broader socio-historical-cultural aspects of an activity.

A model of correspondence

- Contradictions beyond the upper triangle require expansive learning cycles for the broader school and educational system to build the *System's* capacity for transformation. Table 2 summarizes types of contradictions empirically encountered and corresponding levels of transformation and expansive learning.

Table 2. Contradictions in CHAT across all Activity System

Attitudes towards rules: school and system level (e.g., language-in-Education policies)	Adequacy or appropriateness of rules for realizing object (e.g., groups disadvantaged by language-in-Education policies	Divergent understanding of roles and division of labor (e.g., collaboration among content and language teachers

Building the system's capacity for change: Organizational Expansive Learning

Current activities

- Based on the results of the "mirror phase " (questioning and analysis) building capacity needs to start with the "subjects".

- Initial change laboratory meeting completed and analyzed

- Professional learning experiences planned and will be implemented starting September 2019

CONCLUSION

- The framework described above serves as a responsive analytic framework that characterizes complexity of multilingual classrooms and schools with non-linear and transformative capacity building needs (at the individual and system levels).

Conclusion

- Our aim is not to reduce complex phenomena, however, we attempt to construct as, Engeström and Sannino suggest, a 'simplified' explicit model of a new idea that can potentially explain and offer solutions to problematic situations and guide targeted and responsive future action.