



***Launching and sustaining teacher
development collectives:
Complexity qualities and conditions
that support teacher learning***

***Drs. Xavier Fazio & Tiffany Gallagher
Brock University***

***Paper presentation for AERA Annual Conference
April 13 – April 17, 2009
San Diego, CA***

Framing the discussion

As outlined by Nel Noddings, caring should be an essential part of education.

- We agree with Noddings in that communities of learners experience both a community in which collective ideas emerge and a space in which caring and respect is modeled, expressed, and practiced in the collective.

Introduction

This paper presents a post-hoc analysis of two teacher development cases from which significant professional learning emerged.

Science Teachers Learning Collective



Learning Resource Teachers Collective



Characteristic Qualities of Complexity Theory

Theoretical Perspectives

Complex systems (Davis, Sumara, & Luce-Kapler, 2008):

- o adaptive,
- o self-maintaining,
- o sustain their coherence across time

Qualities of a complex system (Davis & Sumara, 2006):

- o self-organized; bottom-up emergent; short-range relationships; nested structures; ambiguously bounded; organizationally closed; structure determined; far-from equilibrium

Theoretical Perspectives

Complexity theory and teacher development:

- o simultaneous consideration for the elements found within teacher development systems (e.g. teachers, students, and resources),
- o relationships amongst these elements,
- o social context of these elements

When these elements act together, they create an emergent system of interdependent processes; that is, a *complex* teacher development system (Bell & Gilbert, 1996; Hoban, 2002; Zellermyer & Margolin, 2005)



Research Questions

- What common processes and products did these successful teacher development collectives possess?
- Can complexity provide a framework for facilitating professional learning collectives?



Methodology

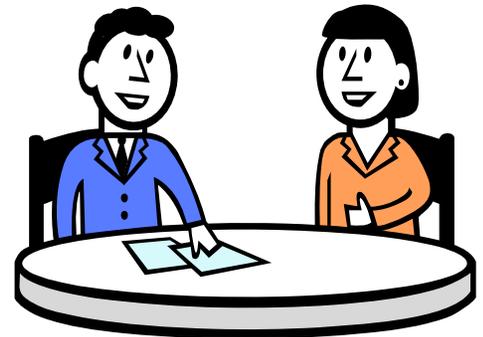
Post-hoc Analyses: link complexity theory qualities to structures and functions within the collectives

Data sources:

- field notes during open-ended discussions
- facilitators' reflections/journal
- interviews

Weaving of Analyses and Peer Debriefing:

- initial independent review for three qualities
- researchers verified each other's categorizations
- collaborative weaving of the categories is a form of peer debriefing



Research Context of the Collectives

Science Teachers Development Collective:

- 4 middle & secondary school science teachers (MEd in progress)
- Explored teaching science inquiry (SI) and nature of science (NOS) through action research



Research Context of the Collectives

Learning Resource Teachers (LRTs) Collective:



- o 15 elementary learning resource teachers
- o Appraised a resource program to enhance and support the practices of LRTs

Analysis

Findings are focused around three qualities of complexity theory:

Self-organized (autonomous, oriented)

Bottom-up emergent (interdependent, non-directed)

Ambiguously bounded (intra-contextual, fuzzy boundary)

We chose to focus on specific qualities that best reflected our position as facilitators and researchers within our respective collectives.



Findings (Self-organized)

- o participants unified and focused their actions on a common purpose
- o each member valued the conceptual inputs and reflections offered by others
- o teachers had significant expertise in their respective domains, yet were diverse with respect to their roles and relationships within their individual schools
- o diversity in each teacher development collective enhanced discussions and reflection during collaborative sessions and allowed the teachers to develop personally and professionally

Findings (Bottom-up emergent)

- *“Although I [the facilitator] assumed the chair for the first few collaborative meetings, by the end of fourth meeting, I joined the group and became a participant. All teachers seemed to focus and reflect on the “habits of mind” concept found in the front matter of the science curriculum, and they are becoming more critical of the provincial curriculum. For instance, handouts were shared. It was very useful to the discussions and I think we are beginning to switch from a cooperative and practical-oriented group to a more participatory one.”* (Facilitator, Journal entry, Science teacher collective)
- *“The learning resource teachers appreciate debriefing sessions and opportunities to share best practices with their colleagues. There were several suggestions that future meetings should continue with the existing members taking a leadership role.”* (Facilitator, Fieldnotes, Learning resource teacher collective)



Findings (Ambiguously bounded)

- lack of distinction amongst the levels of organization of the collectives
- fuzzy boundary between the schools and the collectives as the teachers were not familiar with each others' local context of practice
- dynamic, yet organizationally closed relationships amongst the teachers and the facilitator developed
- active interactions with open discussions in which there was a continual knowledge exchange
- discussion topics ranged beyond those that were anticipated and appeared to be tangential



Diagrammatic Representation of a Teacher Development Collective

See: <http://www.ed.brocku.ca/~tgallagh/AERA2009-Complexity.doc>

Implications for Professional Learning Facilitators

- o Qualities and conditions of complexity that promote teacher development are essential aspects of professional learning.
- o If specific conditions within a collective are prompted, then a complex teacher development system may be induced (Miranda, Beisigel, Simmt, Davis, & Sumara, 2006).
- o Structurally speaking, the components of a teacher development collective (teacher development initiation, collective interactions) need to be established before the active processes (e.g., engaging, applying, interpreting, self-assessing, critiquing) may begin.



Implications for Professional Learning Facilitators continued...

- A recommendation to teacher development facilitators is to use complexity theory in the design and implementation of their projects.
- The role of the facilitator is key to promoting the qualities of complex systems. This role should be recognized at the inception of the teacher development collective, during the functioning activities of the collective and when analyzing the teacher development collective's outcomes.

Future Research Opportunities

- o Educational researchers may utilize complexity theory for evaluating and studying teacher development collectives.
- o We have offered a diagrammatic representation as a model to consider when developing and enabling complex system collectives in their contexts – research of this application is required.
- o The facilitator ensures that the qualities of complex systems are recognized during the functioning activities of the collective; research into the role of this individual would be insightful.





Thank you!

Please feel free to contact us:

xavier.fazio@brocku.ca

tiffany.gallagher@brocku.ca

**Our handouts are available on the AERA 2009
conference proceedings webpage**

Selected References

- Bell, B., & J.K. Gilbert. 1996. *Teacher Development: a Model for Science Education*. London, UK: Falmer Press.
- Davis, B., D. Sumara, & R. Luce-Kapler. 2008. *Engaging Minds: Changing Teaching in Complex Times* (2nd Ed.). New York: Taylor and Francis.
- Davis, B., & D. Sumara. 2006. *Complexity and Education: Inquiries into Learning, Teaching, and Research*. Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Davis, B., & E. Simmt. 2003. Understanding learning systems: mathematics teaching and complexity science. *Journal for Research in Mathematics Education* 34 (2): 137–167.
- Doll, W.E.J. 1993. *A Post-modern Perspective on Curriculum*. New York: Teachers College Press.
- Hoban, G.F. 2002. *Teacher Learning for Educational Change: A Systems Thinking Approach*. Buckingham, UK: Open University Press.
- Loucks-Horsley, S., N. Love, K. Stiles, S. Mundry, & P.W. Hewson. 2003. *Designing Professional Development for Teachers of Science and Mathematics*. Thousand Oaks, CA: Sage Publications.
- Miranda, H., M. Beisigel, E. Simmt, B. Davis, & D. Sumara. 2006. Consciousness, collectivity and culture: Experiences of intimacy in mathematics learning. *Journal of the Canadian Association for Curriculum Studies* 4 (2): 123-137.
- Zellermayer, M., & I. Margolin. 2005. Teacher Educators' Professional Learning Described Through the Lens of Complexity Theory. *Teachers College Record* 107(6):1275-1304. <http://www.tcrecord.org>, ID Number: 11911.