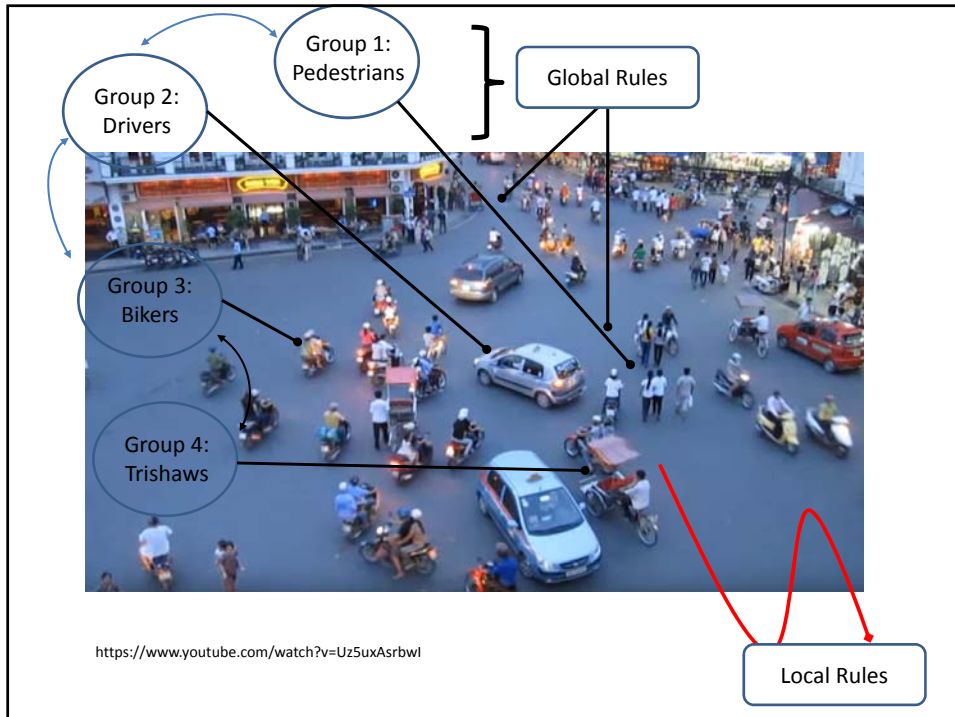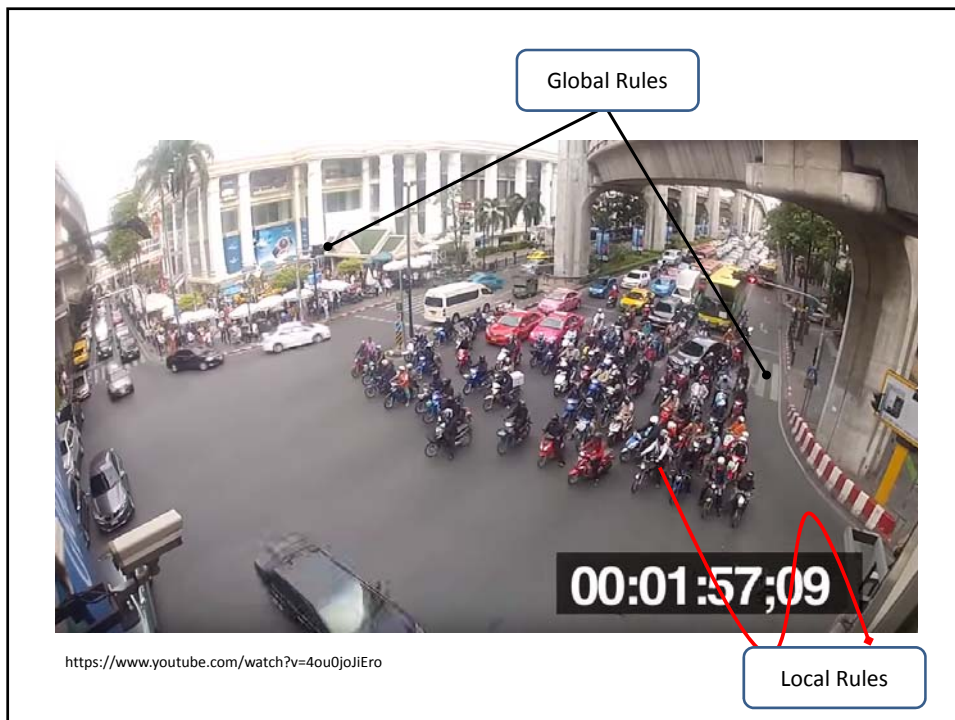# Reframing Instructional Leadership Research

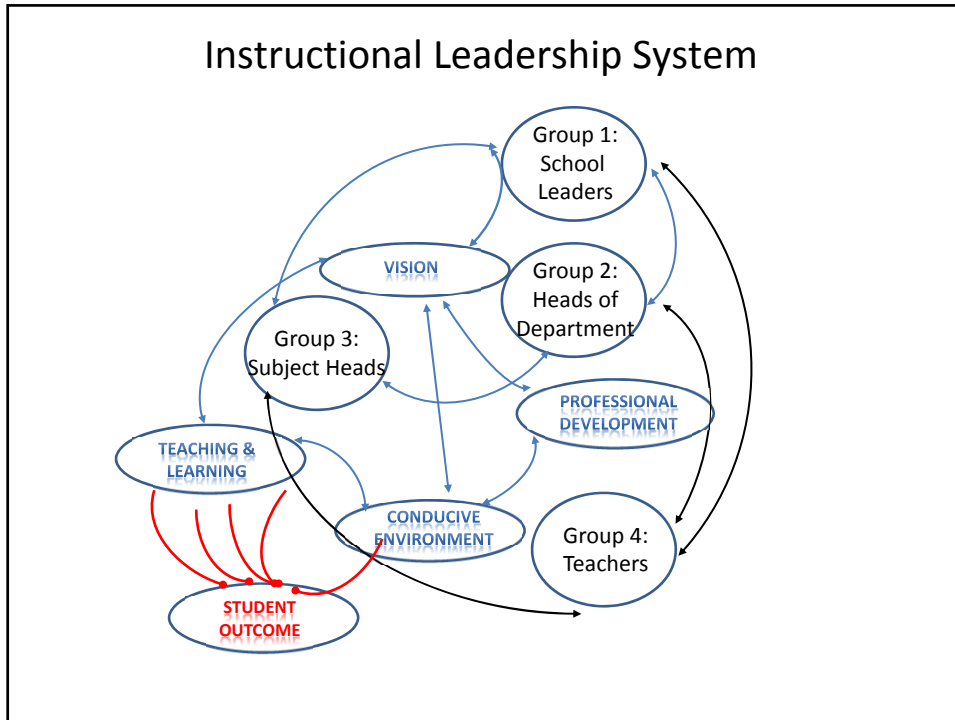David Ng Foo Seong
National Institute of Education
Singapore

https://www.youtube.com/watch?v=Uz5uxAsrbwI

https://www.youtube.com/watch?v=AXAjZQxNUfQ

https://www.youtube.com/watch?v=4ou0joJiEro

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by Dr David Ng (National Institute of Education Singapore)

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System Characteristics

- Multiple agents
- Nonlinear interactions among agents
- Self-organization
- Emergent behaviours
  - hierarchical organizations
  - information processing
  - dynamics (patterns of change)
  - adaption (evolution) and learning

Adapted from: Anderson, R. A., Crabtree, B. F., Steele, D. J., & McDaniel, R. R. (2005). Case study research: the view from complexity science. Qualitative Health Research, 15(5), 669-685.

Instructional Leadership System

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Instructional Leadership System

Realities of Instructional Leadership

- Local Instructional Leadership takes place in a dense and connected web of interactions and relationships between individuals, communities, and institutions

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Instructional Leadership Research

- Heck, R. H., & Hallinger, P. (1997). Epistemological frames and methods for the study of school leadership. In Annual Meeting of the American Educational Research Association, Chicago.

  …regards leadership as an 'adaptive process rather than a unitary independent force' and allows for the possibility that 'causal relationships may be multi-directional, change over time and even be non-linear' (p. 168)

Instructional Leadership Research

- Hallinger, P., & Chen, J. (2015). Review of research on educational leadership and management in Asia: A comparative analysis of research topics and methods, 1995–2012. Educational Management Administration & Leadership, 43(1), 5-27.
  - 478 articles (1995 – 2012)

Table 2. Quantitative publications analyzed by five statistical levels.

Level	Type of statistical analysis	No. of articles (%)
1	Descriptive	29 (14.6%)
2	Single causal factor–correlational	41 (20.6%)
3	Single causal factor–correlational with controls	29 (14.6%)
4	Multiple factor	29 (14.6%)
5	Advanced modeling	56 (28.1%)

*Advanced modeling: confirmatory factor analysis, hierarchical linear modeling, and structural equation modeling

Instructional Leadership Research

• Hallinger, P. (2010). A review of three decades of doctoral studies using the Principal Instructional Management Rating Scale: A lens on methodological progress in educational leadership. Educational Administration Quarterly, 0013161X10383412.
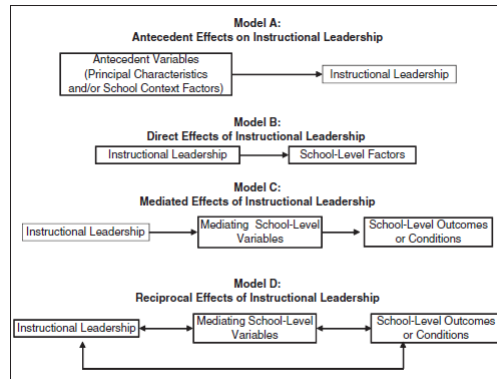
Model A:
Antecedent Effects on Instructional Leadership

Antecedent Variables (Principal Characteristics and/or School Context Factors) → Instructional Leadership

Model B:
Direct Effects of Instructional Leadership

Instructional Leadership → School-Level Factors

Model C:
Mediated Effects of Instructional Leadership

Instructional Leadership → Mediating School-Level Variables → School-Level Outcomes or Conditions

Model D:
Reciprocal Effects of Instructional Leadership

Instructional Leadership ↔ Mediating School-Level Variables ↔ School-Level Outcomes or Conditions

Figure 3. Conceptual frameworks for studying principal leadership
Adapted from Pitner (1988, pp. 105-108).

Instructional Leadership Research

• Walker, A., Hu, R., & Qian, H. (2012). Principal leadership in China: An initial review. School Effectiveness and School Improvement, 23(4), 369-399.
  • imported frameworks;
  • indigenous investigations;
  • Contextual influences

Table 3.   Contextual variables influencing the principalship.

Contextual Factors		Impacts	Effects
Personal Context	Age, gender, education background	√	
	Years of teaching, years of principalship	√	
	Training/continued education	√	
	Knowledge & capacity	√	
	Personalities	√	
School Context	School location	√	
	School level/type	√	
	School designation	√	√
	School climate/culture	√	
	Financial & human resources	√	
	Student achievement & development		√
	Teachers' gender, years of teaching & position	√	
	Teachers' job satisfaction & commitment		√
	Other stakeholders	√	
	School effectiveness/progress		√
Societal Context	Societal culture	√	
	Relevant administrative system	√	
	Political ideology	√	

Instructional Leadership Research: Considerations

- Global theory and framework
- Local Instructional Leadership takes place in a dense and connected web of interactions and relationships between individuals, communities, and institutions
- How do you collect, represent and analyze data to reflect the dynamic system and include context as a social structure and as a system?

Reframing Instructional Leadership Research

- We need methods that will account for:
  - Recursive nature of interventions
  - Multiple interconnected and non-linear relationships
  - Alternative conceptualizations of causality
  - Ongoing and dynamic nature of change
  - Emergent patterns and structures
  - Network development and behavior

The Field of Complexity Science

- A loosely bound collection of ideas, principles and influences from a number of other bodies of knowledge, including
  - chaos theory
  - fractal geometry
  - cybernetics
  - complex adaptive systems
  - postmodernism
  - systems thinking
- Discovery of similar patterns, processes and relationships in a wide variety of phenomena
  - related to the nature and dynamics of change

Castellani, B., & Hafferty, F. W. (2009). *Sociology and complexity science: a new field of inquiry*. Springer Science & Business Media.

The Field of Complexity Science

- Dynamics:
  - The study of continually changing structure and behaviour of systems

- Information:
  - The study of representation, symbols, and communication

- Computation:
  - The study of how systems process information and act on the results

- Evolution:
  - The study of how systems adapt to constantly changing environment
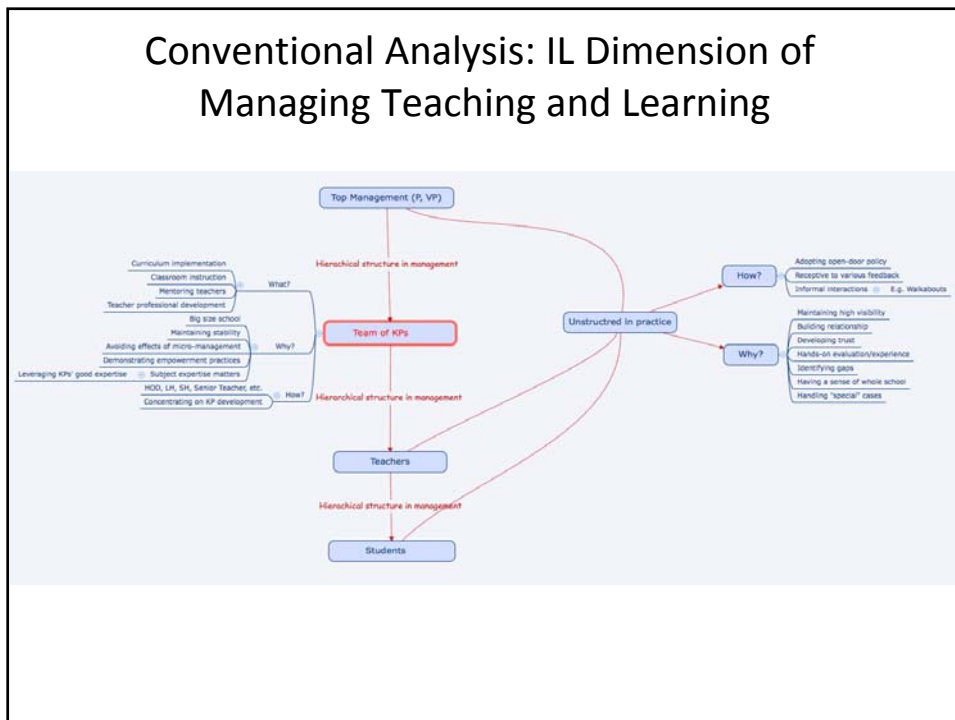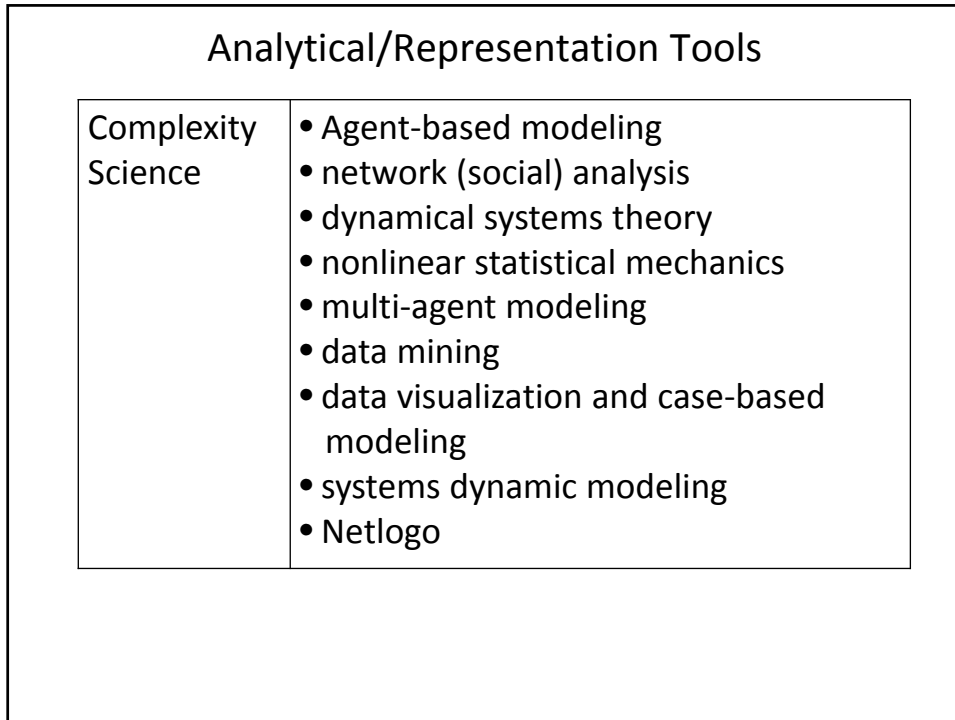
Mitchell, M. (2009). *Complexity: A guided tour*. Oxford University Press.

Methodology Assumptions

	Systems	Behaviors	Relations	Dynamics
Complexity Science	Systems and problems are dynamic and open, non-linear	Individuals are adaptive, subject to errors and biases; self-organize and co-evolve with system and each other	Actors/agents thrive on relationships, flows, ties, values, beliefs	Change is non-linear, iterative, trial and error

Adapted from Ramalingam, B. (2013). *Aid on the edge of chaos: rethinking international cooperation in a complex world.* OUP Oxford.

Methodology Assumptions in complexity sciences

• Social reality and data should be seen as self-organizing, emergent, nonlinear, evolving, dynamic, network-based, interdependent

• No one method (especially statistics) can effectively identify, model, capture, control, manage or explain social reality

• A multiplicity of mixed methods, perspectives and sets of analytical tools are needed

Analytical/Representation Tools

Complexity Science	• Agent-based modeling • network (social) analysis • dynamical systems theory • nonlinear statistical mechanics • multi-agent modeling • data mining • data visualization and case-based modeling • systems dynamic modeling • Netlogo

## Conventional Analysis: IL Dimension of Managing Teaching and Learning

Social Network Analysis of IL Dimension of Managing Teaching and Learning

- Recognizing interacting units and relationships among interacting units
- Agents/actors and their actions are interdependent rather than dependent
- Provides a formal and conceptual means for thinking about social properties and processes
- A means of looking at emergent effects

Social Network Analysis

Expected Reporting and Decision-making Pathways in Managing Teaching and Learning
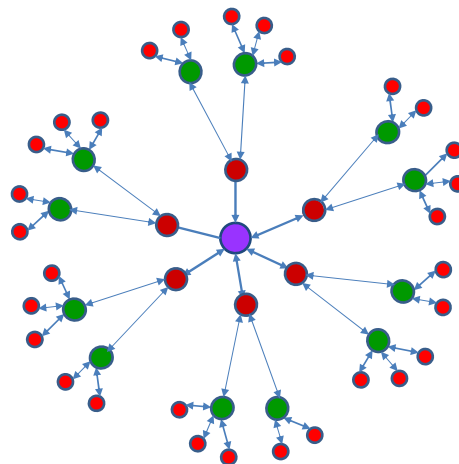
P: Principal/VP

H: Head of Department

S: Subject Head

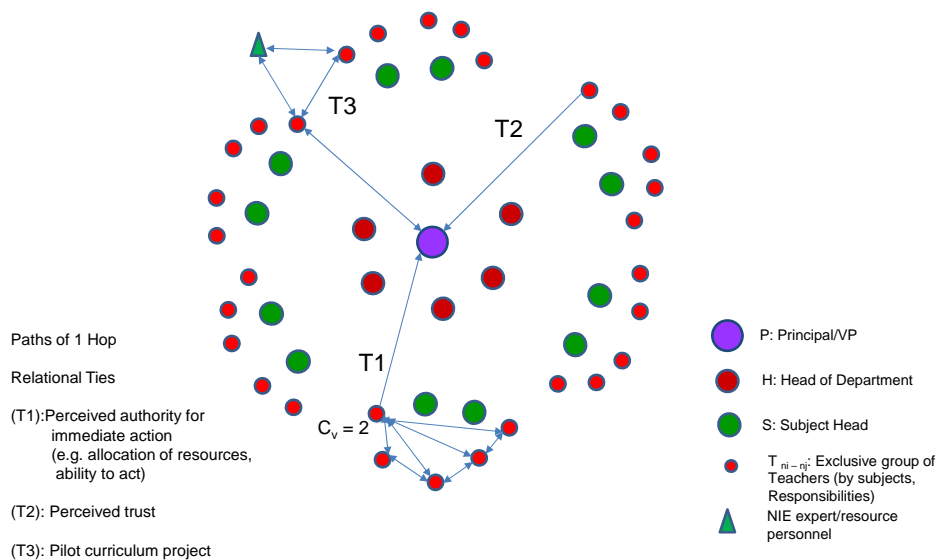T_{ni-nj}: Exclusive group of Teachers (by subjects, Responsibilities)

$P=(H_1 - H_6, S_1 - S_{12}T_1 - T_{30})$
Reporting Path involves 3 Hops

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Social Network Analysis: Concept of Centrality

- Centrality:
  - A stratification measure
  - How to measure "power"
- Does power depend on local or distal connections?
- Does decision making depend on the power/centrality of other actors/agents to which a focal vertex is connected?
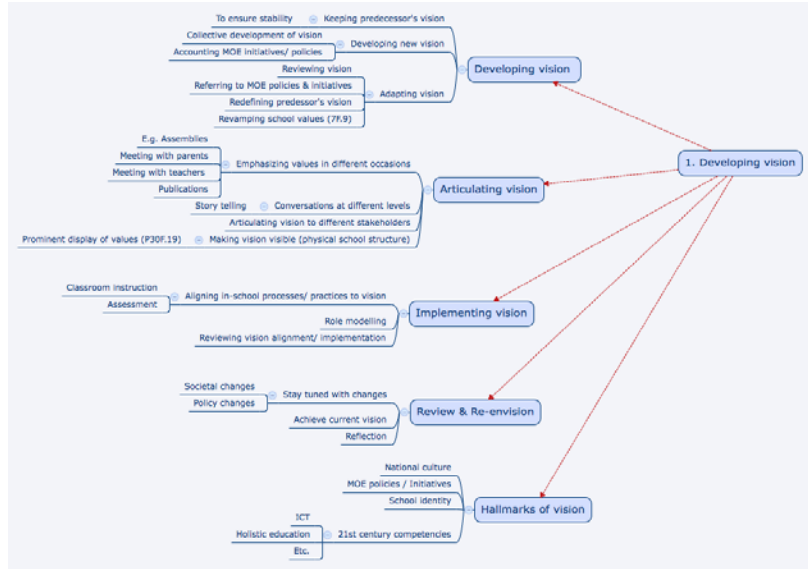- What are the 'rules of the game' with regard to the activation of multiple relationships?

Social Network Analysis

**Actual** Reporting and Decision-making Pathways in Managing Teaching and Learning

Paths of 1 Hop

Relational Ties

(T1): Perceived authority for immediate action (e.g. allocation of resources, ability to act)

(T2): Perceived trust

(T3): Pilot curriculum project

$C_v = 2$

P: Principal/VP

H: Head of Department

S: Subject Head

$T_{ni - nj}$: Exclusive group of Teachers (by subjects, Responsibilities)

NIE expert/resource personnel

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Conventional Analysis: IL Dimension of Vision

Systems Dynamic Modeling
Causal Loop Diagram: IL Dimension of Vision

Systems Dyanmic Modeling: Causal Loop diagram
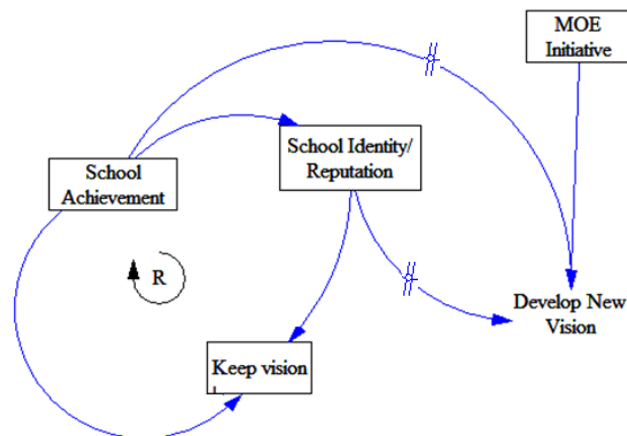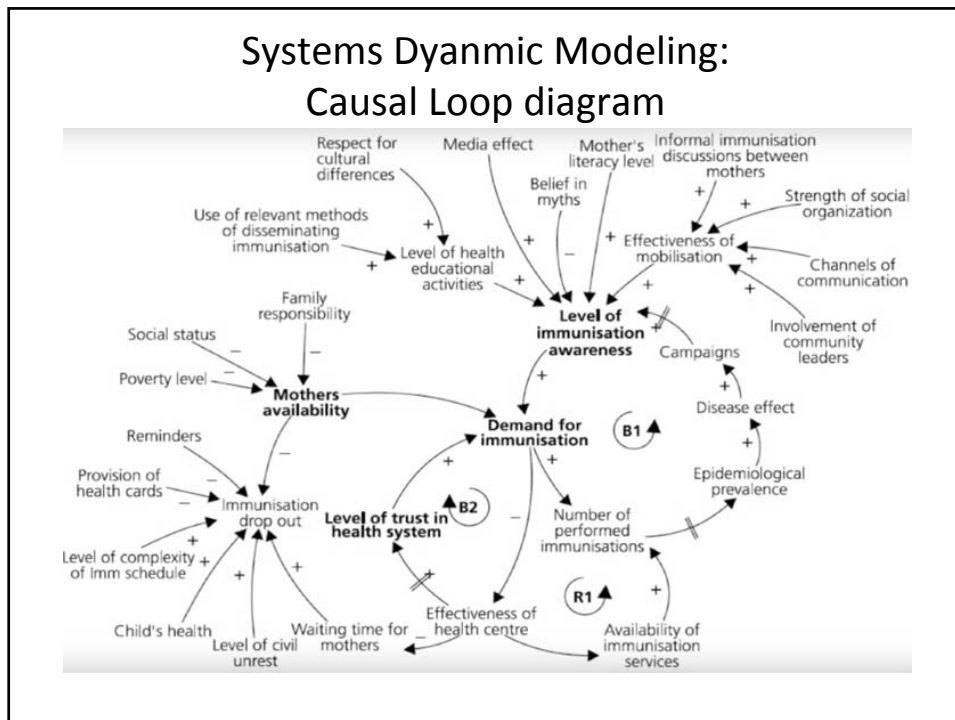
Reframing Instructional Leadership Research: Potential Research Questions

FOCUS: What is the local (indigenous) knowledge of IL and how does it emerge?

- MOE Divisions' interactions affect implementation of school curriculum in school
    - RQ: How do different divisions' interactions shape school leaders' perception of curriculum policies?
    - RQ: How do school leaders' perception of curriculum policies evolve into implementation at the school level?

Reframing Instructional Leadership Research:
Potential Research Questions

- Examination of ties among Departments in the school that affect school improvement
  - RQ: What are the implications for long-term strategy process for school improvement in light of the complex and adaptive nature of departments?
- Multiple feedback loops and their effects on emergence and performance of staff
  - What are the key decision criteria that the school leader needs to know from the school's perspective, from the system perspective, and from MOE's (regulatory body) perspective?

Reframing Instructional Leadership Research:
Conclusion

- Instructional Leadership is both global and local
- Reframing IL research through a complex systems lens complements conventional social science research
- Teleology(the study of evidences of design in nature): To account for local context and hence develop local/indigenous knowledge
- Findings of local knowledge of processes will be useful for policy makers

Thank you

Methodology Assumptions in Quantitative Social Sciences

- Social reality is a form of disorganized complexity
- Goal is to explain majority, aggregate behaviour in terms of probability theory and the laws of averages;
- Common tools: variable-based linear models, in which variables are treated as 'rigorously real' measures of social reality;
- Model-in-hand, the goal is to identify, measure, describe and (hopefully) control or manage how certain independent variables impact one or more dependent variables of concern;
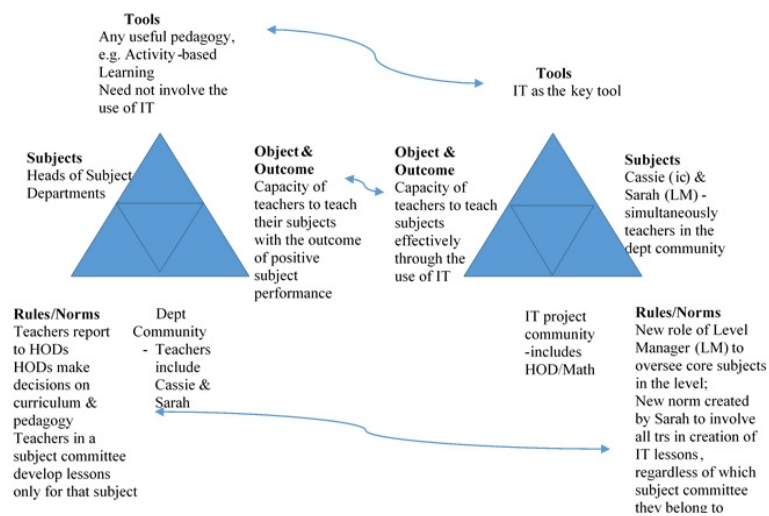
http://discoversociety.org/2014/11/04/focus-complexity-and-the-failure-of-quantitative-social-science/

Agent-based Modeling

- Simulators: MASON, Swarm, Ascape, RePast etc.
- Decision-making
- Leadership
- Strategic choice
- Networks
- Collective action

Conventional Analysis: DL Incorporating Activity Theory and Tension

Tools
Any useful pedagogy, e.g. Activity-based Learning
Need not involve the use of IT

Tools
IT as the key tool

Subjects
Heads of Subject Departments

Object & Outcome
Capacity of teachers to teach their subjects with the outcome of positive subject performance

Object & Outcome
Capacity of teachers to teach subjects effectively through the use of IT

Subjects
Cassie (ic) & Sarah (LM) - simultaneously teachers in the dept community

Rules/Norms
Teachers report to HODs
HODs make decisions on curriculum & pedagogy
Teachers in a subject committee develop lessons only for that subject

Dept Community
- Teachers include Cassie & Sarah

IT project community -includes HOD/Math

Rules/Norms
New role of Level Manager (LM) to oversee core subjects in the level;
New norm created by Sarah to involve all trs in creation of IT lessons, regardless of which subject committee they belong to

Methodology Assumptions in Quantitative Social Sciences

- Quantitative social science seeks to explain majority, aggregate behaviour in terms of probability theory and the laws of averages;
- Common tools: variable-based linear models, in which variables are treated as 'rigorously real' measures of social reality;
- Using model to identify, measure, describe and control or manage how certain independent variables impact one or more dependent variables of concern;

http://discoversociety.org/2014/11/04/focus-complexity-and-the failure-of-quantitative-social-science/

Methodology Assumptions in Quantitative Social Sciences

- if done right, these models lead to reasonably linear explanations of why things happen the way they do;
- which, in turn, leads to relatively straightforward policy recommendations for what to do about them.

http://discoversociety.org/2014/11/04/focus-complexity-and-the failure-of-quantitative-social-science/

Methodology Assumptions of Conventional Social Science

	Systems	Behaviors	Relations	Dynamics
Conventional Social Science	Systems and problems are closed, static, linear; reductionist	Individuals use rational deduction; behaviors and action can be specified from top-down	Actors/agents can be treated as independent and individualized	Change is direct, result of action (cause & effect); proportional, additive and predictable

Adapted from Ramalingam, B. (2013). *Aid on the edge of chaos: rethinking international cooperation in a complex world.* OUP Oxford.

Analytical Tools

Conventional Social Science	Simple statistics: means, standard division, regression analysis, multilevel modeling, longitudinal data analysis, structural equation models (path analysis), discourse analysis, interaction analysis, content analysis, narrative methods, grounded theory, ethnography, etc.
Complexity Science	Agent-based modeling, network (social) analysis, dynamical systems theory, nonlinear statistical mechanics, multi-agent modeling, data mining, data visualization and case-based modeling, systems dynamic modeling