Reframing Instructional Leadership Research

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https://www.youtube.com/watch?v=Uz5uxAsrbwI
Provocateur Session: Reframing Instructional Leadership
by Dr David Ng (National Institute of Education Singapore)
System Characteristics

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


Instructional Leadership System

Group 1: School Leaders
Group 2: Heads of Department
Group 3: Subject Heads
Group 4: Teachers

- Vision
- Teaching & Learning
- Conducive Environment
- Professional Development
- Student Outcome

Provocateur Session: Reframing Instructional Leadership
by Dr David Ng (National Institute of Education Singapore)
Realities of Instructional Leadership

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


"...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


  • 478 articles (1995 – 2012)

<table>
<thead>
<tr>
<th>Level</th>
<th>Type of statistical analysis</th>
<th>No. of articles (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Descriptive</td>
<td>29 (14.6%)</td>
</tr>
<tr>
<td>2</td>
<td>Single causal factor–correlational</td>
<td>41 (20.6%)</td>
</tr>
<tr>
<td>3</td>
<td>Single causal factor–correlational with controls</td>
<td>29 (14.6%)</td>
</tr>
<tr>
<td>4</td>
<td>Multiple factor</td>
<td>29 (14.6%)</td>
</tr>
<tr>
<td>5</td>
<td>Advanced modeling</td>
<td>56 (28.1%)</td>
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</tbody>
</table>

*Advanced modeling: confirmatory factor analysis, hierarchical linear modeling, and structural equation modeling
Asia Leadership Roundtable 2016

**Surfacing indigenous leader practices (knowledge)**

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**Instructional Leadership Research**


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**Instructional Leadership Research**

  - imported frameworks;
  - indigenous investigations;
  - Contextual influences

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**Provocateur Session: Reframing Instructional Leadership**

*by Dr David Ng (National Institute of Education Singapore)*
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


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

## Methodology Assumptions

<table>
<thead>
<tr>
<th>Systems</th>
<th>Behaviors</th>
<th>Relations</th>
<th>Dynamics</th>
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</thead>
<tbody>
<tr>
<td>Complexity Science</td>
<td>Systems and problems are dynamic and open, non-linear</td>
<td>Individuals are adaptive, subject to errors and biases; self-organize and co-evolve with system and each other</td>
<td>Actors/agents thrive on relationships, flows, ties, values, beliefs</td>
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</tbody>
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## 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**

<table>
<thead>
<tr>
<th>Complexity Science</th>
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</thead>
<tbody>
<tr>
<td>• Agent-based modeling</td>
<td></td>
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<tr>
<td>• network (social) analysis</td>
<td></td>
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<tr>
<td>• dynamical systems theory</td>
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<td>• nonlinear statistical mechanics</td>
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<td>• multi-agent modeling</td>
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<td>• data mining</td>
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<td>• data visualization and case-based modeling</td>
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<td>• systems dynamic modeling</td>
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<tr>
<td>• Netlogo</td>
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</table>

**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

P=(H1, H6, S1, S2, T1, T30)
Reporting Path involves 3 Hops
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

\[ C_v = 2 \]

- T1
- T2
- T3

- P: Principal/VP
- H: Head of Department
- S: Subject Head
- $T_{ij}$: Exclusive group of Teachers (by subjects, Responsibilities)
- NIE expert/resource personnel
Conventional Analysis: IL Dimension of Vision

Systems Dynamic Modeling
Causal Loop Diagram: IL Dimension of Vision
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;

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
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;


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.

Methodology Assumptions of Conventional Social Science

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<tr>
<td>Conventional Social Science</td>
<td>Systems and problems are closed, static, linear; reductionist</td>
<td>Individuals use rational deduction; behaviors and action can be specified from top-down</td>
<td>Actors/agents can be treated as independent and individualized</td>
</tr>
</tbody>
</table>


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 |
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