Modelling the complexity of technology adoption in higher education teaching practice

Irena White
Flinders University School of Education
Overview

• What is the problem with technology adoption?
• Who are the actors?
• What are the factors?
• How can we connect the actors and the factors?
• What might this reveal?
“Getting innovations to scale is an increasingly important mandate for educational research, yet also a vexing challenge for researchers who have attempted to take this on.”

Sabelli & Harris, 2015, p. 13

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Actors in technology adoption


Innovators
Early Adopters
Early Majority
Late Majority
Laggards

Everett M Rogers
1931 to 2004


Image retrieved from https://en.wikipedia.org/wiki/Everett_Rogers

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Universities as complex adaptive systems

A ‘wicked’ problem!


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The ‘wicked’ problem in complexity

“Our models of faculty support are out-dated remnants of machine-age thinking and we are missing rich opportunities for collaborative solutions. We must begin to understand each higher education institutions [sic] as members of a complex ecosystem. Each is an organic system that is in a continuous state of change.”

Pacansky-Brock, 2015, para 5
Technology adoption actors in a university ecosystem

Macro level: Management
Meso level: Support Services
Micro level: Adopters
Micro level: Innovators
Factors in bottom up technology adoption

- Leadership and vision
- Project funding
- Central systems
- Project management
- Experimentation
- Evidence of effectiveness
- Development of innovation
- Dissemination
- Readiness to adopt
- Sharing ideas and ownership

What actionable insights can be revealed through modelling the connections between the actors and the factors?

Agent-based modelling as a complementary research method for investigating complex adaptive systems
A Multi-Mediator (Agent-based) Model of bottom-up technology adoption

The actors

- Macro level: Management
- Meso level: Support Services
- Micro level: Adopters
- Micro level: Innovators

The factors

- Leadership and vision
- Project funding
- Central systems
- Project management
- Experimentation
- Evidence of effectiveness
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Enabling and inhibiting roles and relationships

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What if ... Agent-based Modelling was a dance?


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Agent-based Modelling as “a third way of doing science”  
Axelrod, 2005, p.1

In this study the Multi-Mediator (Agent-based) Model

- Forces the modeler to be explicit
- Provides alternative visualizations of the domain
- Captures dynamic properties better than most quantitative or qualitative tools

Source: AERA 2017 presentation Education as a Complex System: Implications for Educational Research and Policy

James A. Levin  
Department of Education Studies, University of California, San Diego

Michael J. Jacobson  
Centre for Research on Computer Supported Learning and Cognition, The University of Sydney, Australia
How it works

Actors (macro, meso and micro) provide a scenario that describes their experience of bottom-up technology adoption in a university and apply this to a computer simulation model.
Applying the scenario to the model

Step 1

Legend for Multi-Mediator Model

<table>
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<tr>
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<th>Actor</th>
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<tr>
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<td>Factor</td>
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<td>![Earth]</td>
<td>Level of influence</td>
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<td>![Green Up]</td>
<td>Enabling interaction</td>
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<td>![Red Down]</td>
<td>Inhibiting interaction</td>
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Macro

- Leadership and vision
- Project funding

Meso

- Project management
- Central systems
- Experimentation

Micro innovator

- Evidence of effectiveness
- Development of innovation
- Dissemination

Micro adopter

- Readiness to adopt
- Sharing ideas and ownership
Showing enabling relationships

Legend for Multi-Mediator Model

- Actor
- Factor
- Level of influence
- Enabling interaction
- Inhibiting interaction

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Adding inhibiting relationships

Legend for Multi-Mediator Model

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Applying levels of influence

Legend for Multi-Mediator Model

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Macro
- Leadership and vision
- Project funding

Meso
- Project management
- Central systems
- Experimentation

Micro innovator
- Evidence of effectiveness
- Development of innovation
- Dissemination

Micro adopter
- Readiness to adopt
- Sharing ideas and ownership
... all influences are at maximum

**From this:** applied connections

**To this:** when the model is run
... only leadership and vision

From this ...

... to this
What if ...

... project management is added

From this ...

... to this
An invitation to be part of this study

This study provides you with a confidential opportunity to investigate

• problems with bottom-up technology adoption in your university
• connect actors and factors to reveal actionable insights

Thank you for this opportunity to share the research methods I am using in this study

Irena White
irena.white@flinders.edu.au

To register your interest in this study please go to www.surveymonkey.com/r/MPHT7C2