

# POLICY-DRIVEN RESEARCH AND EVIDENCE-BASED INTERVENTIONS IN SINGAPORE

Presentation to OECD Workshop: Linking Evidence to  
Practice

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# Linking research to practice

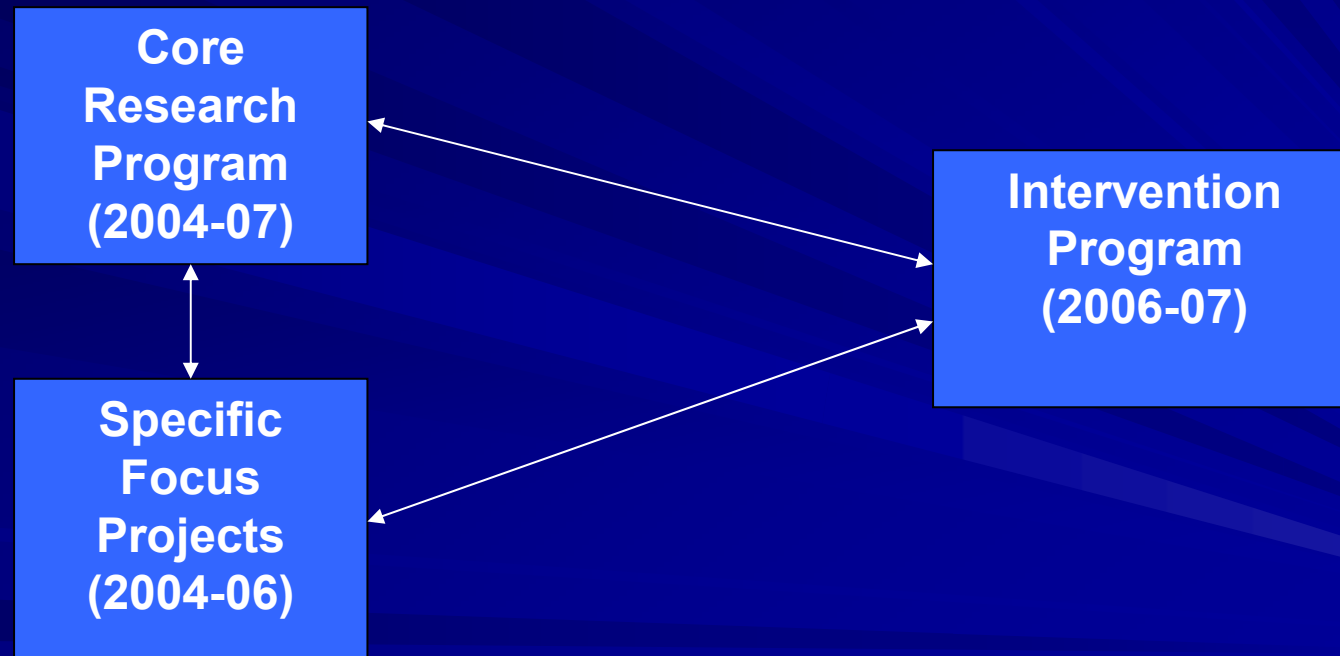
- In Singapore, responsibility for conducting educational research and linking evidence to practice is primarily the responsibility of CRPP (Centre for Research in Pedagogy and Practice), established in 2003 by the Ministry of Education with a five year grant of S\$49m
- Began active research program in early 2004.
- Currently a staff of 140+ (academic, general and technical)

# CRPP – 2003+

## ■ Objectives

- to describe and measure classroom pedagogy (curriculum, teaching, assessment) (rich description)
- to gauge the impact of pedagogy, teachers and schools on student outcomes, controlling for student characteristics (multivariate causal analysis of pedagogy and student outcomes)
- to propose the redesign of pedagogical practice through an evidence-based intervention strategies

# Organization of R & I



	<b>Core Research Program (6 whole of curriculum projects)</b>	<b>Special Focus Projects (100+; mostly domain specific)</b>
<b>Maths</b>	X	X
<b>Science</b>	X	X
<b>English Language</b>	X	X
<b>MT</b>	X	X
<b>Social Studies</b>	X	X
<b>IT</b>	X	X

## 2. Core Research Program

## 2.1 Core Research Program: Questions

1. What **institutional rules** (principles, goals, values), discourses and cultural norms govern the organization and functioning of education in Singapore?
2. **How** do teachers teach in Singapore? To what extent do pedagogical practices (curriculum, assessment, teaching) vary by level, stream and subject
3. **Why** do Singaporean teachers teach the way they do? What explains variations in pedagogical practice?
4. What are the principal academic, economic, cultural, social, civic, and psychological **outcomes** of schooling?
5. **Do teachers make a difference?** What explains variations in student academic, social, economic, civic, and psycho-social outcomes?

## Core Research Questions (cont'd)

6. What pedagogical practices **optimise** student outcomes, broadly conceived? Do these vary by subject, level, stream, student characteristics or teacher characteristics?
7. What **life goals and plans** do young Singaporeans set for themselves? What **life choices** do they actually make? What distinctive **life pathways** result from these choices? What factors explain these choices and pathways?
8. What school-related **policy initiatives** are likely to
  - moderate the impact of social background on classroom processes and student outcomes
  - improve equity and
  - promote high levels of **capital formation and student wellbeing?**

## 2.2. Research Design Principles

- The aim of the Core research program is to provide a comprehensive, rich descriptive and multivariate of pedagogical practices and student outcomes across the system.
- Core research program: key design principles
  - **Multi-method**
    - Quantitative and qualitative
    - Survey, observational, interview, discourse analytic, case study
  - **Multi-level**
    - Samples of students, classrooms and school are nested across panels, and linked to a comprehensive population data base on achievement and socio-demographic background
  - **Cross sectional and longitudinal**
    - Cross sectional samples and multi-year repeated measures are combined
  - **Representative and generalisable**
    - Schools, teachers and students are selected from large random stratified samples (100 plus schools in Core program alone).

## Core Panel Design

Panels	Sample	Key Focus
<b>Panel 1</b>	Entire school population from 1993-2002+ (500,000 students pa)	Modelling impact of SES, race and MT on student achievement as measured by high stakes national assessments in Grade 4, 6, 10, 12
<b>Panel 2</b>	<p>Sample (n=19,000) of all P5 and S3 students in 80 schools (40 P, 40 S)</p> <p>Linked to Panels 1, 3, 4 and 5.</p> <p>Sample of teachers (n=4000) in same P and S schools across all subjects.</p>	<p>Students: Describing patterns of pedagogical practice and modelling impact of pedagogy on student achievement (E, M)</p> <p>Teachers: mapping pedagogical capacities and teaching practices. Also school climate and leadership.</p>
<b>Panel 3</b>	<p>2004: Sample of 500+ lessons in Math, English, Science, Social Studies, Chinese, Malay and Tamil in 36 schools. Sub sample Panel 2 sample.</p> <p>2005: Sample of 420 lessons in 20 schools with special focus on MT, NT and Special Stream</p> <p>Linked to Panels 1, 2, 4 and 5.</p>	Pedagogical practices (level, subject, stream).

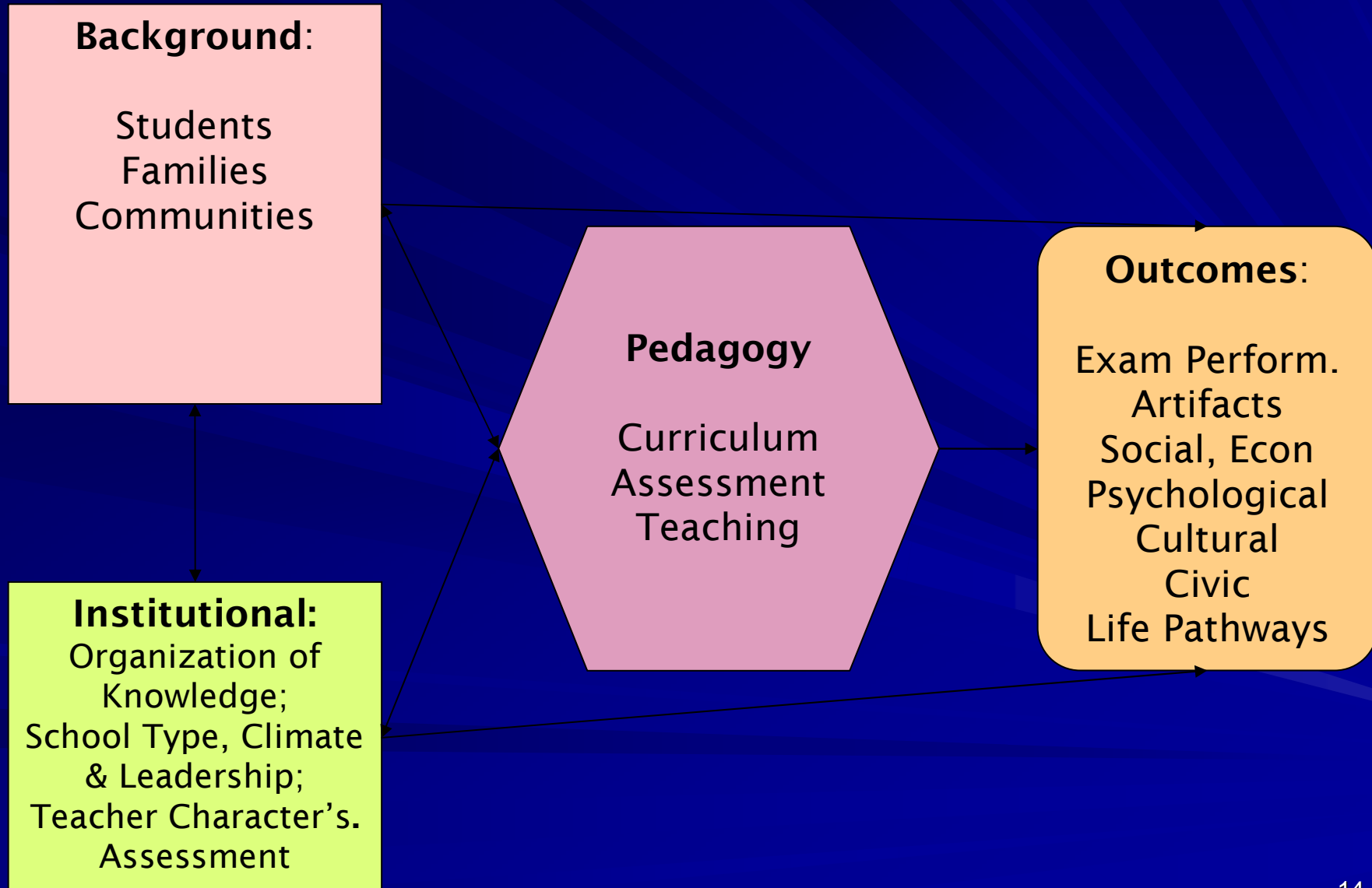
Panels	Sample	Key Focus
<b>Panel 4</b>	<p>Audio-taping and video-taping of lessons drawn from cluster sample of Panel 3 sample. Transcription and electronic coding and tagging of 600+ lessons</p> <p>Linked to Panels 1, 2, 3 and 5.</p>	<p>Classroom talk, social interaction and knowledge construction.</p>
<b>Panel 5</b>	<p>Same sample of 36+23 schools as in Panel 3.</p> <p>Linked to Panels 1, 2, 3 and 4</p>	<p>Teacher assessment tasks and student artefacts (class-work, homework, project work).</p>
<b>Panel 6</b>	<p>Sample of students (n=28,000) in 80 schools (40 P, 40 S) in grades P4 and S1 plus 30 post secondary institutions (JCEs, Polys, ITEs) in PS1</p>	<p>Longitudinal measures of life (incl. schl) experiences, patterns of social participation and attainment (academic, economic, social, civic), SWB and life goals, choices and pathways</p>

# Outcome Measures by Panel

Outcome Measures	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
<i>1. Teacher/Pedagogy/School</i>						
Classroom pedagogical practices		X	X	X	X	X
Organisation of school knowledge		X	X	x	x	
Teacher characteristics and capacities	x	X	x		x	
School climate and leadership		X				

Outcome Measures	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
<i>2. Student Outcomes</i>						
Student high-stakes assessment performance (P4, PSLE, O, N, and A levels)	X					X
Domain-specific assessment performance (Maths, English) (P5, S3)		X				X
Student motivation, engagement, meta-cognition, self-regulation, etc.		X				X
Student artefacts (outputs)			x		X	
Institutional capacities and attainments (work, schooling, citizenship, friendship, care of the self, etc.)						X
Social-psychological development (agency, identity, reflexivity)		x				X
Subjective well-being (life satisfaction, existential aspirations and satisfaction, anxiety, depression, resilience)						X
						13

# Core Research Design



## 2.3. Reframing CRPP 2006-2013

- Initial 2004-2006 framework OK for baseline research and first round interventions, but unsuitable for a long term R&I program
- Alternative frameworks...
- Solution: Matrix model
  - **Strands:**
    - the *enduring and generic* professional problematics of educational practice and policy making
  - **Themes:**
    - the key *policy settings* and persistent *local* problematics of professional practice

# Strands: Enduring Professional Problematics

- Cognition, Motivation and Learning
- Language, Communication and Textual Practices
- Knowledge and Curriculum
- Teaching, Technology and Instructional Strategies
- Assessment and Psychometric Studies
- Student Outcomes and Pathways
- Teacher Development
- Leadership and Organizational Change
- Policy Studies

# Themes: Local Policy Settings/Priorities

- Engaged Learners
- Deep Understanding
- Social Participation and Active Citizenship
- Student Diversity and Inclusion
- Performances of Understanding: Multi-dimensional / Multi-modal Authentic Assessment
- Reflective Pedagogy
- Pedagogical Alignment

# Strands by Themes

	Engaged Learners	Deep Understanding	Social Competencies	Diversity & Inclusion	Assessment	Reflective Pedagogy	Pedagogical Alignment
Cognition, Motivation & Learning	X	X	X	X	X	X	X
Language, Communication & Textual Practices	X	X	X	X	X	X	X
Knowledge & Curriculum	X	X	X	X	X	X	X
Teaching, Technology & Instructional Strategies	X	X	X	X	X	X	X
Assessment & Psychometric Studies	X	X	X	X	X	X	X
Student Outcomes & Pathways	X	X	X	X	X	X	X
Teacher Development	X	X	X	X	X	X	X
Leadership & Organizational Change	X	X	X	X	X	X	X
Policy & Institutional Arrangements	X	X	X	X	X	X	X



# 3. INTERVENTION PROGRAM

- Third component of CRPP's brief: "to propose the redesign of pedagogical practice through an evidence-based intervention strategies"
- Based substantially on Core 1 and SFPs research findings. Not prescribed by MOE but projects >\$200k have to be approved by MOE
- Commenced intervention program in Jan 2006 with 7 intervention projects plus a further 8 in July 2006.
- Currently 70% new expenditure on intervention projects
- An intervention program based on bottom up proposals for individual projects but having to satisfy clear criteria

# Selection Criteria

- Consistent with **CRPP's R&I framework** (matrix model of strands and themes) and therefore consistent with MOE policy priorities
- Must have **pedagogical warrant**
  - Strong research support from CRPP baseline data: Core 1, SFPs
  - Strong support and buy-in of principal and teachers in target schools
    - Local face validity and priority
  - Endorsed by MOE as consistent with policy priorities (>\$200k)
- **Co-constructed and carefully planned:** teachers, principals and researchers
  - Problem definition, data gathering, reflection and problem solving
- Must be **inquiry based and data rich**
  - Teachers as classroom researchers. Action research +

# Selection Criteria (cont'd)

- **Pedagogically skeptical and non-sectarian:** what matters is not what pedagogical faith PIs belong to, but what works to achieve given objectives.
  - No pedagogical magic bullets, Holy Grails, one size fits all solutions, transcendental pedagogical principles, no pedagogical wars of religion thank you very much. (Subtext: pay due regard to local post-colonial cultural sensitivities and to Asian teaching/learning paradox).
  - Recognize that **teaching situations** are inherently problematic, messy, indeterminate, non-routine, uncertain, unstable, unique, reflexive, fluid, unpredictable and agentic...even in Singapore
  - **Good teaching** cannot be bureaucratically scripted. Good teaching **as** complex reflective **practice** requiring continuous and on-going inquiry, reflection and principled practical judgement in ever-changing classroom circumstances

- Recognize that sustained **pedagogical change** ....
  - is complex and multi-factorial
  - is hard work technically and emotionally (need to focus on emotional work of teaching, especially teaching against the grain)
  - is uncertain and risky (professionally and politically)
  - Needs teacher extrinsic rewards and recognition
  
- **Iterative, *in situ*, sustained** over time (2 years min)
  - Not conventional PD workshop format
  
- **Outcomes** focused, not outputs driven
  - Implementation practices and processes
  - Student outcomes
  
- **Theory driven**, not a fishing expedition

- **Quasi-experimental repeated measures longitudinal designs** with control and (multiple) experimental groups strongly preferred although not required.
  - Design experiments ok but need ultimately to establish cost and benefit relativities
  - No randomised experimental designs
    - Pedagogically inauthentic. Weak validity, poor predictive capacity for real world classrooms
    - Politically impossible (schooling as mechanism of class formation /social mobility)
    - Very expensive
- Include focus on **pedagogical alignment** between knowledge/curriculum, assessment and teaching strategies eg. Understanding by Design framework
- Include focus on **implicit teacher beliefs** (cultural schema, vernacular sociology of teaching and learning): making transparent, interrogating, challenging
  - Eg. Teaching is talking and learning is listening; learning a linear function of teaching; teaching is a private social practice and learning is an intra-subjective event; knowledge is hierarchically organized; deficit discourses (ability, family background)

# Selection Criteria cont'd

- Include focus on **building teacher capacity**
  - curriculum design
  - assessment literacy (formative, authentic)
  - evidence-based “reflective pedagogy”
  - pedagogical realignment at the classroom and school level (e.g., through “backward mapping,” professional deliberation)
  - Recognizing, valuing and supporting student diversity...

- Include focus on promoting **organizational capacity** , to wit, the organization of the school as a professional learning community
  - Professional reflection / deliberation
    - Individual
    - Collective (year level, subject)
  - Evidence-based decision making
    - School-wide student data base
    - Continuous formative assessment
  - Distributed leadership
  - School based, pedagogically focused and effective PD
  - Appointment of dedicated expert pedagogical development teachers (more later)
  
- Over the intervention program as a whole, strong focus on students in lower tracks and disadvantaged neighbourhoods

### 3.3. Current Interventions

- *Approved*
  - School-Based Reading Intervention Model to Improve Reading Instruction
  - Building Teacher Capacity in Curriculum & Pedagogical Design Using Understanding By Design Models in Normal Technical Classrooms
  - Improving Teacher Assessment Literacy: A Longitudinal Intervention Study
  - Developing Teacher Capacity in Group-work
  - Development of Singaporean Primary 1 Diagnostic Reading Assessment
  - The Implementation of the Japanese Lesson Study as a Teacher Directed Form of Instructional Improvement in a Primary School

- Project work, task design & authentic assessment at lower secondary school
- Transforming science practical pedagogy & practice through innovative department innovative departmental planning
- Enhancing the pedagogy of maths teachers to emphasise understanding, reason & communication in their classrooms
- Intervening in In-Service: Thinking Beyond the Textbook
- Building Teachers' Capacity in Narrativity & Textual Practices

## ■ *Interventions -- Under development*

- MOE School-Based Curriculum Development Initiative: Prototype Schools
- Understanding Understanding: The Relationship between High Stakes Assessments and Authentic Assessment
- Disciplinarity & School Subject Knowledge in Secondary Math, Science & English Language & Literature
- Task Structure, Project Work & Authentic Assessment in Upper Primary Math, Science & Social Studies
- Reading/Writing Across the Curriculum in Primary Schools
- Modelling Effective Pedagogies: Math, ELL & Science
- How Should I Live? Values Education, Rich Conversations & Extended Writing
- The Arts & a Passion for Learning Across the Curriculum
- Distributed Leadership & Curriculum Development in Secondary Schools
- Development of a professional partnership school

# 4. Some Scale Up Issues

Successful intervention programs include a **strategic plan**, including scale-up and sustainability strategies that incorporate consideration of –

- **spread:** implementation of reform practices at additional sites or in additional groups within existing sites
- **depth:** a significant improvement in classroom practice, enacted in deep and meaningful ways, that influences student performance
- **sustainability:** policy and infrastructure systems in place to support continued, deep improvement in classroom practice over time
- **shift in ownership:** transfer of knowledge and authority to sustain the reform to the site, allowing continuous improvement and further scale-up
- **Pedagogical alignment:** alignment of curriculum, assessment and teaching to promote innovative teaching and high quality student outcomes.

1. Interactive/adaptive models, not replication models (Rand, 2004 study)

## 2. Multi-modal

- Workshops and master's courses
  - High legitimacy with teachers. Recognizes teacher agency
  - Good for exposure to and developing awareness of new priorities, research, content knowledge, teacher credentialing
  - Ineffective in changing practice developing practical pedagogical skills and judgement
- Iterative, *in situ*, sustained, classroom-based PD with teachers at the school level
  - Strong on implementation and evaluation. Necessary for sustained pedagogical change at the classroom level

3. Appointment of 2 experienced, dedicated pedagogical support officers to each school, primary and secondary, for full time dedicated work with teachers
  - classroom inquiry (including action research) and reflection
  - Modelling, mentoring and coaching
  - Peer visits, study teams, collective planning and evaluation -- de-privatizing teaching practice.
  
4. Train the trainers: 3/4 months training at CRPP/NIE in classroom research and pedagogical research more broadly

5. Networks, clusters, learning circles, centres of excellence
  - Share information, content and experiences
  - Support development of professional learning conversations and broader professional learning communities
  - Develop professional identities
  - Explore the emotional economy of teaching
6. Professional partnership school (cf., model school, lab school, experimental school) to model effective practice
7. Professional publication in local and international journals, including case studies
8. Substantial resourcing (esp. time) at school level
  - Reduced work loads
  - Support teachers
  - “White space”
  - Singapore: top down support for bottom up initiatives

9. Successful intervention programs eventually require **pedagogical realignment and re-coupling** at the school and systemic level

- In Singapore, strongly coupled (over-determined?) system of bureaucratic, performative, cognitive, discursive and normative control of classroom pedagogy
- Weak professional control over pedagogy
- High stakes assessment system strongly coupled to curriculum and to classroom pedagogy. Assessment system drives classroom pedagogy, prompting teachers to focus on “coverage” of the text and rely on teacher-dominated knowledge transmission and rote learning. This limits the opportunity for significant and sustained pedagogical innovation, assuming teacher capacity
- Consequently, pedagogical change at the systemic level will require loosening of performative (assessment) controls over pedagogical practice
- But this highly problematic politically for two reasons ...

- Ministry has considerable power over pedagogical system that it is fearful of weakening, not because its fearful of loosing its bureaucratic authority, but because the system has been highly successful in the past and gives the Ministry considerable “steerage” over pedagogy
- Strongly institutionalized ethic /ideology of meritocratic social mobility / class formation across the Singapore population. Considerable popular support for meritocratic organization of schooling, including streaming and HSA.

- Policy hiatus:
  - Hiatus between priority for knowledge economy human capital formation and commitment to meritocratic social organization: Pedagogical change and realignment necessary to promote improved student learning and capital formation appropriate for participation in a knowledge economy BUT pedagogical realignment threatens social mobility aspirations of population at large ...

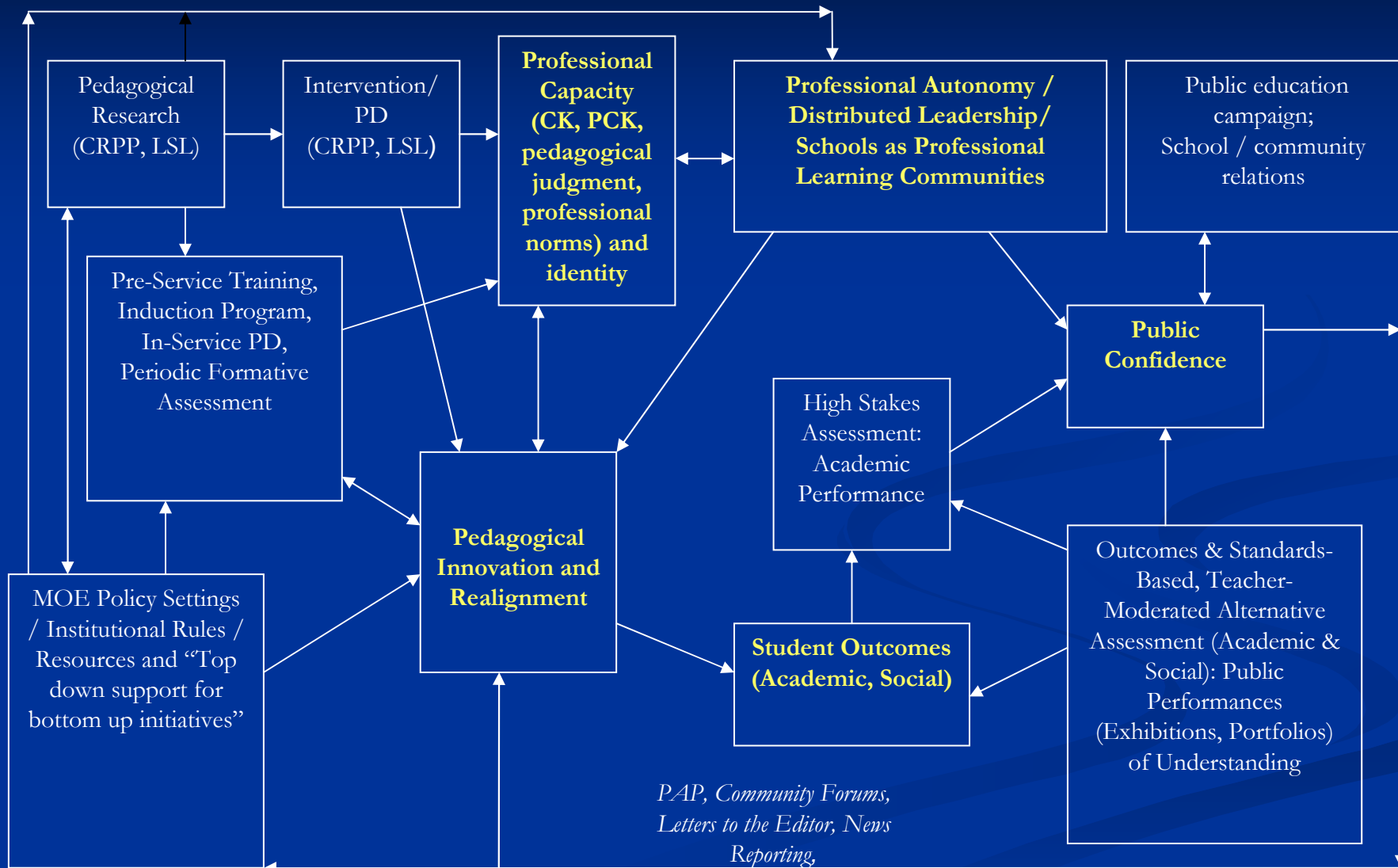
- Policy Conundrum:

- In tightly coupled and over determined systems, cannot change one element of a system without changing all other elements. Over-determined and tightly coupled. Requires simultaneous and multiple realignments
- In loosely coupled systems, changing one element of a system relatively easy but nothing else changes. Under-determined and anarchic.
- What mix or balance (or counter-balancing) of bureaucratic, professional, discursive, performative and cognitive control necessary to promote effective pedagogy and enhance student outcomes in line with policy priorities?

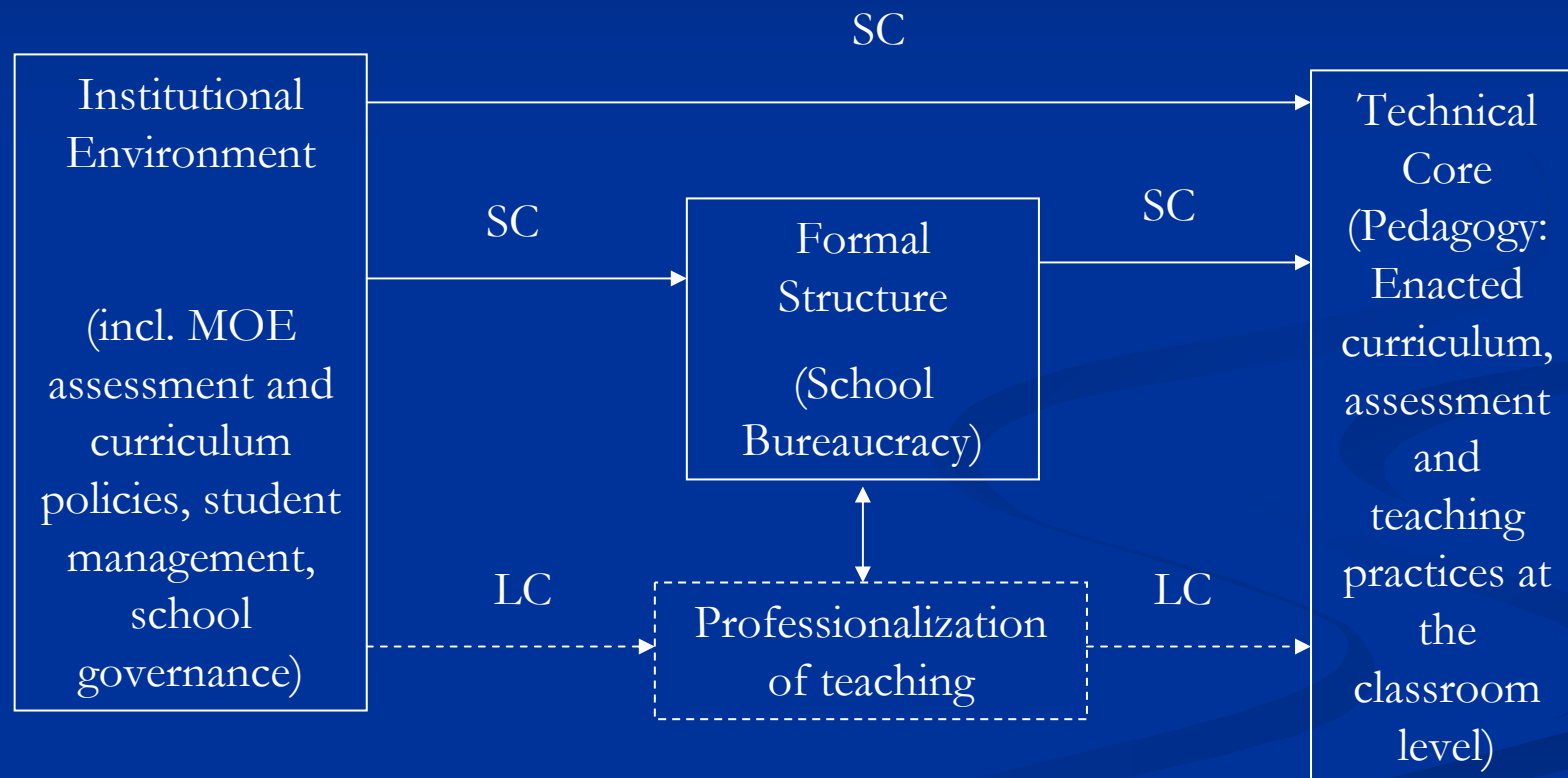
■ Solution:

- Professionalization of teaching: the logic of confidence
  - Technical skills, especially in issues of assessment
  - Professional integrity, fairness, responsibility
  - Inquiry-based reflection and collective decision making: school as a professional learning community
- Partial decoupling of HSA and classroom pedagogy through development of a system wide, moderated, multi-modal, multi-dimensional authentic assessments. Weighted HSA and AA
- Having your cake and eating it too: AA promote both efficiency and equity without loss of social mobility (indeed, will level the playing field, but this perhaps politically difficult)

## CAPACITY BUILDING, PEDAGOGICAL REALIGNMENT AND THE LOGIC OF CONFIDENCE

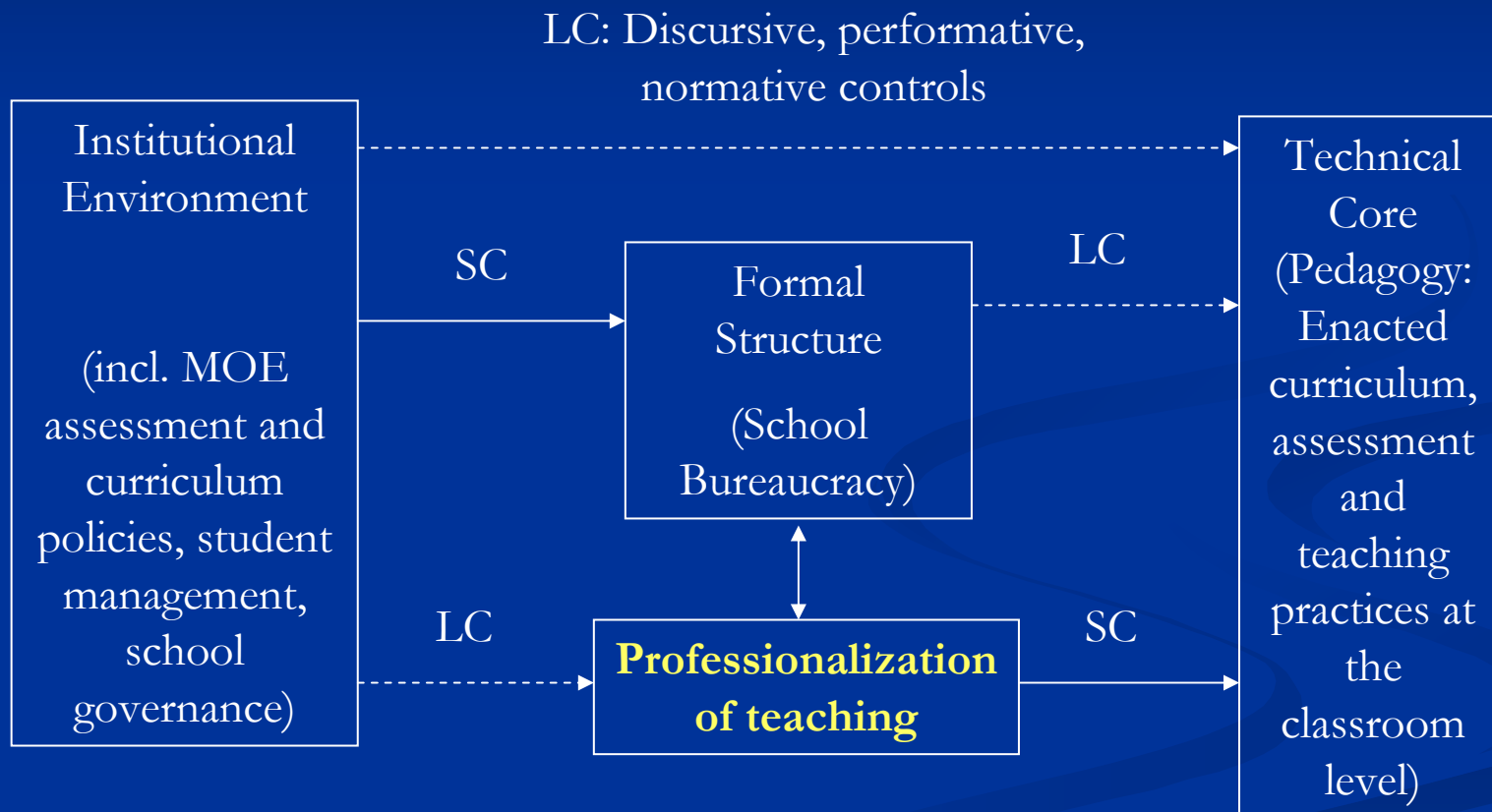


# Simplified Institutional Model of School Organization With Weak Professionalization of Teaching



Legend: SC=Strong coupling; LC =Loose (weak) coupling

# Fig. 5. Simplified Institutional Model of School Organization With Strong Professionalization of Teaching



# 5. Reporting

- Annual technical reports to MOE on research findings
- Summaries of research projects and findings for senior policy makers and professional audiences
- Annual presentations of research findings to Minister, PS and senior MOE officers
- Periodic presentations to mid-level MOE officers, principals and teachers (15 or so a year)
- Presentations at academic conferences (eg., 42 at 2006 AERA) and publications in peer referred journals/books
- Participation in periodic policy conversations with senior MOE officers
- *SingTeach*

Thankyou