POLICY-DRIVEN RESEARCH AND EVIDENCE-BASED INTERVENTIONS IN SINGAPORE

Presentation to OECD Workshop: Linking Evidence to Practice

London, July 6 and 7, 2006.

Professor David Hogan
Dean
Centre for Research in Pedagogy and Practice
National Institute of Education
Singapore

Linking research to practice

- In Singapore, responsibility for conducting educational research and linking evidence to practice is primarily, but not wholly, 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)

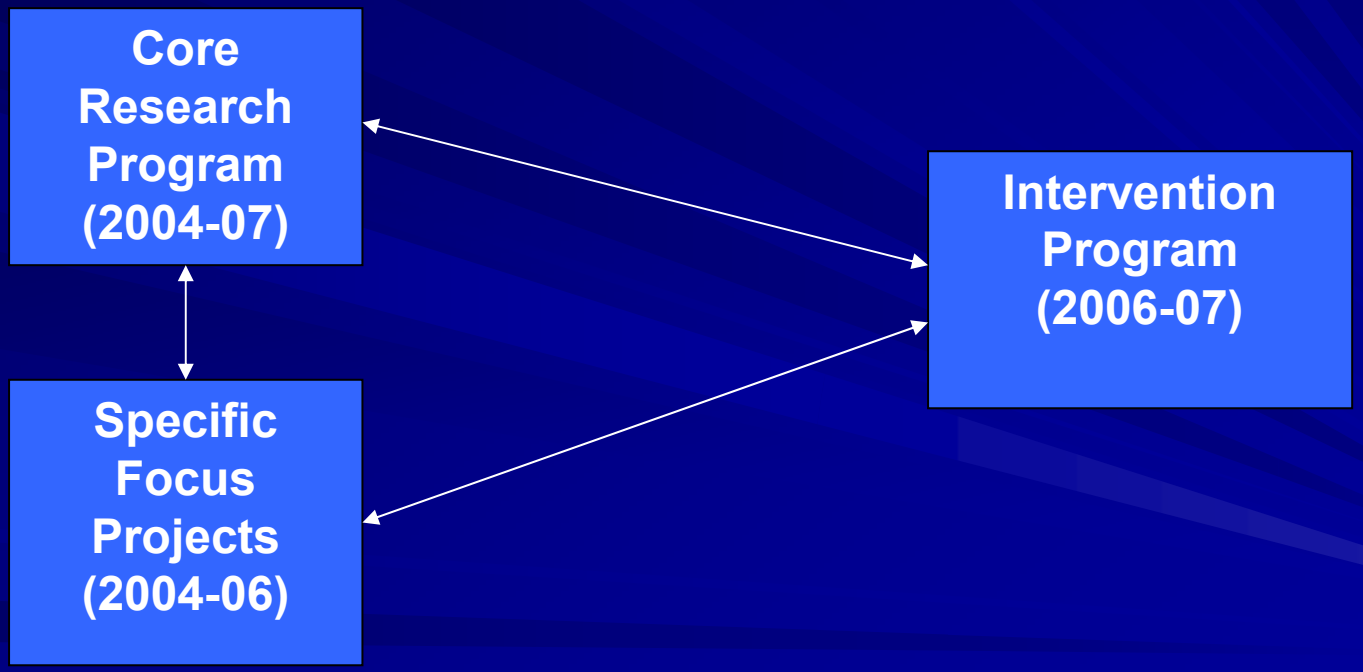
MOE Policy Priorities, 1997-Present

- Asian Economic Crisis, 1997-98
- Government economic planning from 1997 -- focus on human capital formation policy, beginning with the Committee on Economic Competitiveness, followed by the Economic Review Committee, chaired by the Deputy PM, Lee Hsien Loong, now the PM)
- MOE policy priorities
  - Strengthen capital formation necessary for successful development as a knowledge economy through improved pedagogy (*Thinking Schools, Learning Nation, Teach Less Learn More, Initiative and Enterprise*) and student outcomes without sacrificing gains and achievements (eg., TIMSS)
  - Maintain meritocratic organization of schooling (streaming from Primary 5 on) based on national high stakes assessments in grades 4, 6, 10 and 12)
  - Maintain racial and social harmony (eg., national education)
  - Prevent growth of a permanent underclass
  - Maintain policy leverage over educational system in order to keep system responsive to MOE priorities although recent evidence of willingness to permit some de-coupling to foster pedagogical innovation and realignment
  - Enhanced focus on evidence-based policy and planning: CRPP

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 and test the redesign of pedagogical practice through an evidence-based intervention strategy

Initial Organization of R & I



	Core Research Program (6 whole of curriculum projects)	Special Focus Projects (100+; mostly domain specific)
Maths	X	X
Science	X	X
English Language	X	X
MT	X	X
Social Studies	X	X
IT	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
Panel 1	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
Panel 2	Sample (n=19,000) of all P5 and S3 students in 80 schools (40 P, 40 S) Linked to Panels 1, 3, 4 and 5. Sample of teachers (n=4000) in same P and S schools across all subjects.	Students: Describing patterns of pedagogical practice and modelling impact of pedagogy on student achievement (E, M) Teachers: mapping pedagogical capacities and teaching practices. Also school climate and leadership.
Panel 3	2004: Sample of 500+ lessons in Math, English, Science, Social Studies, Chinese, Malay and Tamil in 36 schools. Sub sample Panel 2 sample. 2005: Sample of 420 lessons in 20 schools with special focus on MT, NT and Special Stream Linked to Panels 1, 2, 4 and 5.	Pedagogical practices (level, subject, stream).

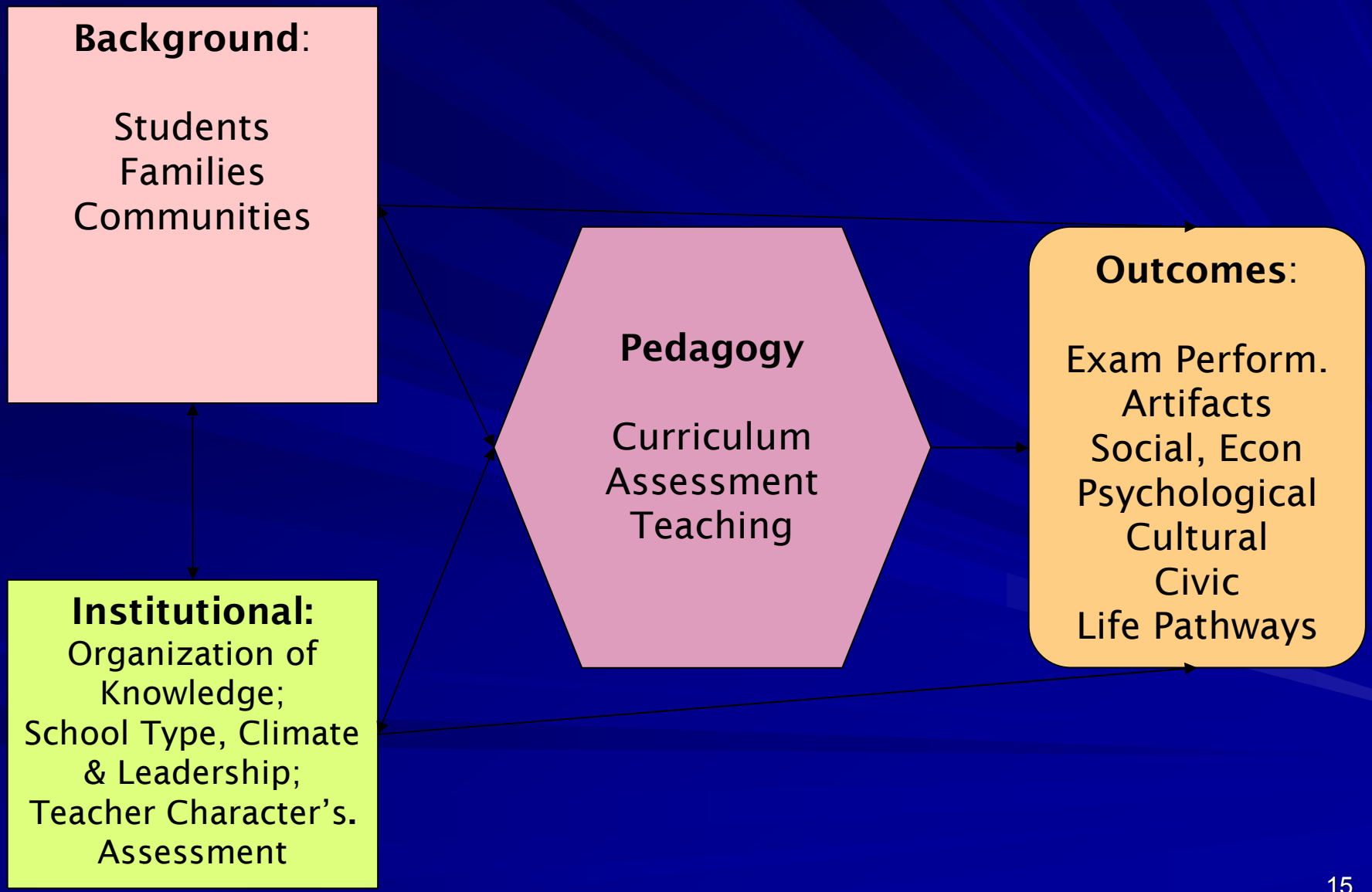
Panels	Sample	Key Focus
Panel 4	Audio-taping and video-taping of lessons drawn from cluster sample of Panel 3 sample. Transcription and electronic coding and tagging of 600+ lessons Linked to Panels 1, 2, 3 and 5.	Classroom talk, social interaction and knowledge construction.
Panel 5	Same sample of 36+23 schools as in Panel 3. Linked to Panels 1, 2, 3 and 4	Teacher assessment tasks and student artefacts (class-work, homework, project work).
Panel 6	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	Longitudinal measures of life (incl. schl) experiences, patterns of social participation and attainment (academic, economic, social, civic), SWB and life goals, choices and pathways

Outcome Measures by Panel

Outcome Measures	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
1. Teacher/Pedagogy/School						
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
2. Student Outcomes						
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**
Life goals, plans, choices and pathways						**X**

Core Research Design



2.3. Reframing CRPP 2006-2013

- Initial 2004-2006 framework OK for baseline research and first round interventions, but arguably unsuitable for a long term R&I program

- Currently considering alternative frameworks…

- Current preferred solution: adoption of a matrix model of "strands" and "themes"
  - **Strands**:
    - the *enduring and generic* professional problematics of educational practice and policy making
  - **Themes**:
    - the key *policy settings* and/or persistent *local* problematics of professional practice in Singapore

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

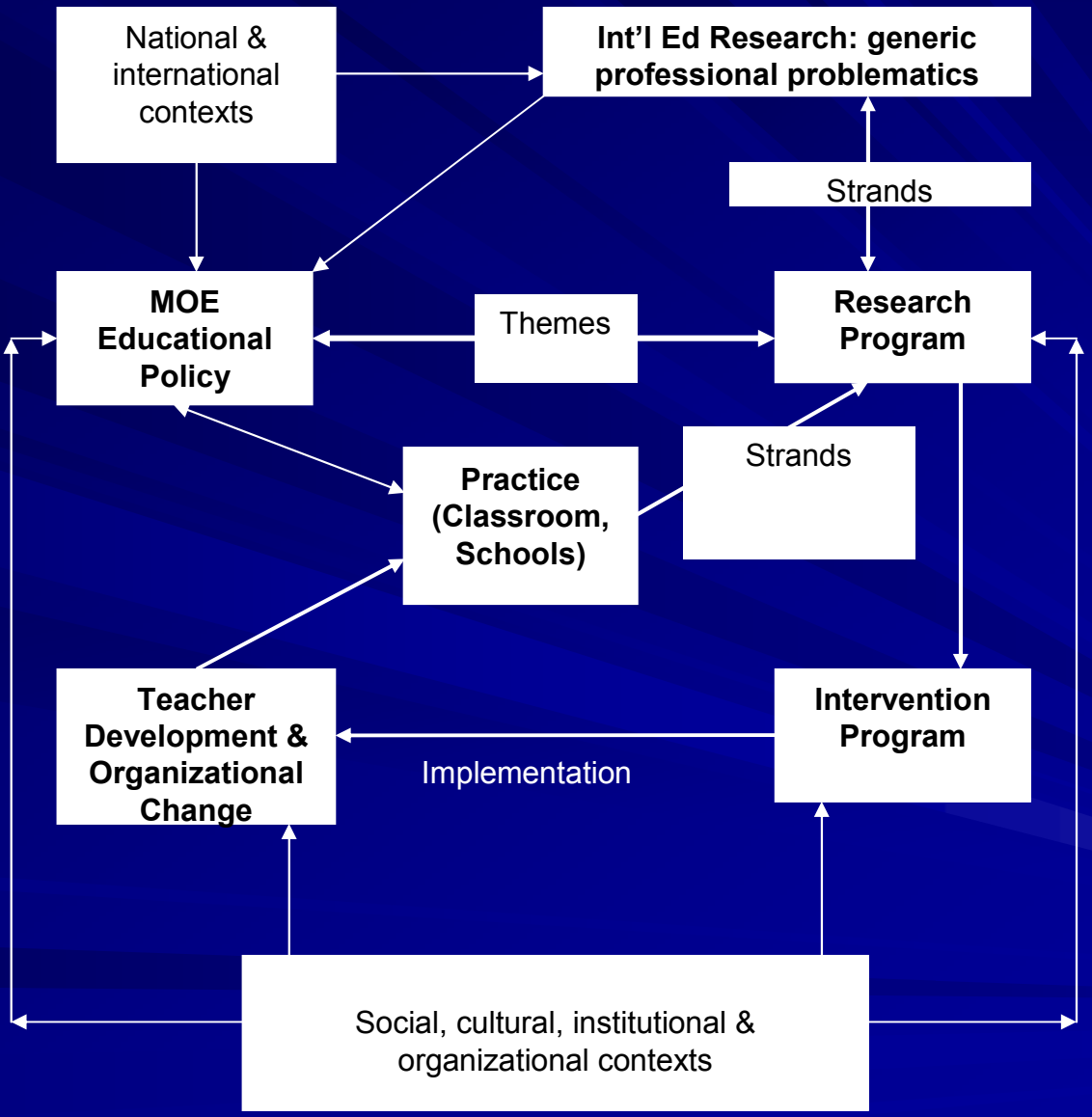
Themes: Local Policy Settings/Priorities

- 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

CRPP: The Logic of Research and Intervention



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
- Over time, with experience, developed an array of selection criteria …

Selection Criteria

- Should be consistent with CRPP's R&I framework and **MOE policy priorities**
- Requires strong **research warrant** from CRPP baseline data (Core 1, SFPs)
- Requires strong **support and buy-in of principal and teachers** in target schools
  - Must have local face validity and priority
- **Co-constructed and carefully planned**: teachers, principals and researchers
  - Teachers should be involved in problem definition, data gathering, reflection and problem solving
- Should be **inquiry-based and data rich**
  - Teachers as classroom researchers (including, but not limited to, action research) …

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…

- Should include a focus on promoting **organizational capacity** -- the organization of the school as a professional learning community through a focus on
  - Evidence-based planning and reflection
    - Continuous formative assessment
    - Individual and collective reflection
  - Distributed leadership
  - School based, pedagogically focused PD
- Over the intervention program as a whole, strong focus on students in lower tracks

Selection Criteria (cont'd)

- Projects should be pedagogically **skeptical, empirically-minded and non-sectarian**.
  - Recognize that **teaching situations** are inherently problematic, messy, indeterminate, non-routine, uncertain, unstable, unique, reflexive, fluid, unpredictable and agentic…even in Singapore
  - Recognize that **good teaching** cannot be bureaucratically scripted. No pedagogical magic bullets, Holy Grails, one size fits all solutions, transcendental pedagogical principles
  - Pay due regard to success of **traditional pedagogy** in Singapore (Subtext: is there an Asian teacher/learning "paradox"?).
  - No pedagogical wars of religion thankyou very much. Effectiveness, not membership of a particular pedagogical faith, is what matters

- **Quasi-experimental repeated measures longitudinal designs** with control and (multiple) experimental groups strongly preferred although not required.
  - Design experiments ok in some circumstances but need ultimately to establish cost and benefit relativities. Prefer quasi-experimental designs
  - No randomised experimental designs
    - Pedagogically inauthentic. Weak validity, poor predictive capacity for real world classrooms
    - Politically very difficult to implement in the real world because of parental commitments to ensuring successful social mobility)
    - Very expensive
    - With development of longitudinal growth modeling, technically unnecessary for robust causal modeling of outcome measures

- Recognize importance of **pedagogical alignment** between knowledge/curriculum, assessment and teaching strategies eg. Understanding by Design framework

- Recognize importance of **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), etc etc

- 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

- **Commit to iterative, *in situ*, classroom focused interventions that are sustained** over time (2 years min) rather than conventional PD workshop format

- Should be **outcomes** focused rather than outputs driven
  - Systematic evaluation of implementation practices and processes
  - Systematic evaluation of student outcomes

- **Theory driven**, not a fishing expedition

4. Some Scale Up Issues

- CRPP still only very early in intervention phase of its work and therefore is still testing/piloting particular interventions.
- Scale up will depend substantially on MOE decisions. CRPP and MOE no discussion of scale up issues to this point of time. Unlikely any decisions on scale up before evidence is in on the current generation of interventions
- However, within CRPP we have begun to form some **preliminary ideas** about scaling up in later years that build on the design principles discussed in the previous section …

Successful intervention programs include a strategic plan, including scale-up and sustainability strategies that incorporate consideration of the following (after Rand 2004)

- **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. Strong preference for **interactive/adaptive scale up** models, not replication models (Rand, 2004 study)

2. Scale up requires system wide **multi-modal forms of PD**
   - 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. We believe that scale-up should include appointment of two experienced and highly trained pedagogical support teachers (PSTs) to each school, primary and secondary, to support teacher inquiry, reflection, planning and pedagogical innovation and realignment (note initial and partial trial of this model in current school based curriculum development initiative)
   - 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 intensive training of pedagogical support teachers (PSTs) in classroom research methods and current 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. In Singapore (and arguably in other countries with similar structures of pedagogical control), successful intervention programs eventually depends on **pedagogical realignment and re-coupling** at the school and systemic level
    - In Singapore, for example, we have a multiply and strongly coupled system of bureaucratic, performative (via high stakes assessment), cognitive (curriculum), discursive and normative control of classroom pedagogy combined with weak professional control
    - High stakes assessment (HSA) system strongly coupled to curriculum and to classroom pedagogy. In particular, assessment system drives classroom pedagogy, prompting teachers to focus on "coverage" of the text and rely on teacher-dominated pedagogies of knowledge transmission and rote learning. This has delivered outcomes valued by the system. At the same time, however, it has also limited the opportunity for significant and sustained pedagogical innovation to achieve newer learner outcomes associated with participation in the knowledge economy that are valued very highly by the government
    - Central challenge for the government is to figure out how to achieve newer priorities without sacrificing or putting at risk earlier successes…

- Arguably, therefore, pedagogical change at the systemic level will require a loosening of bureaucratic and (especially) performative controls over pedagogical practice in order to create the "pedagogical space" for teachers to develop pedagogies that will deliver the kinds of learning outcomes policy makers believes necessary for capital formation appropriate for a leading knowledge economy. (Indeed, some efforts in this direction already via "white space" initiative and O level exemption pathway initiative for some schools)

- But significant loosening of bureaucratic and performative controls constrained by two factors …
  - Ministry's desire to ensure appropriate levels and forms of "steerage" over pedagogy in order to avoid weakly coupled system that is unresponsive to MOE priorities

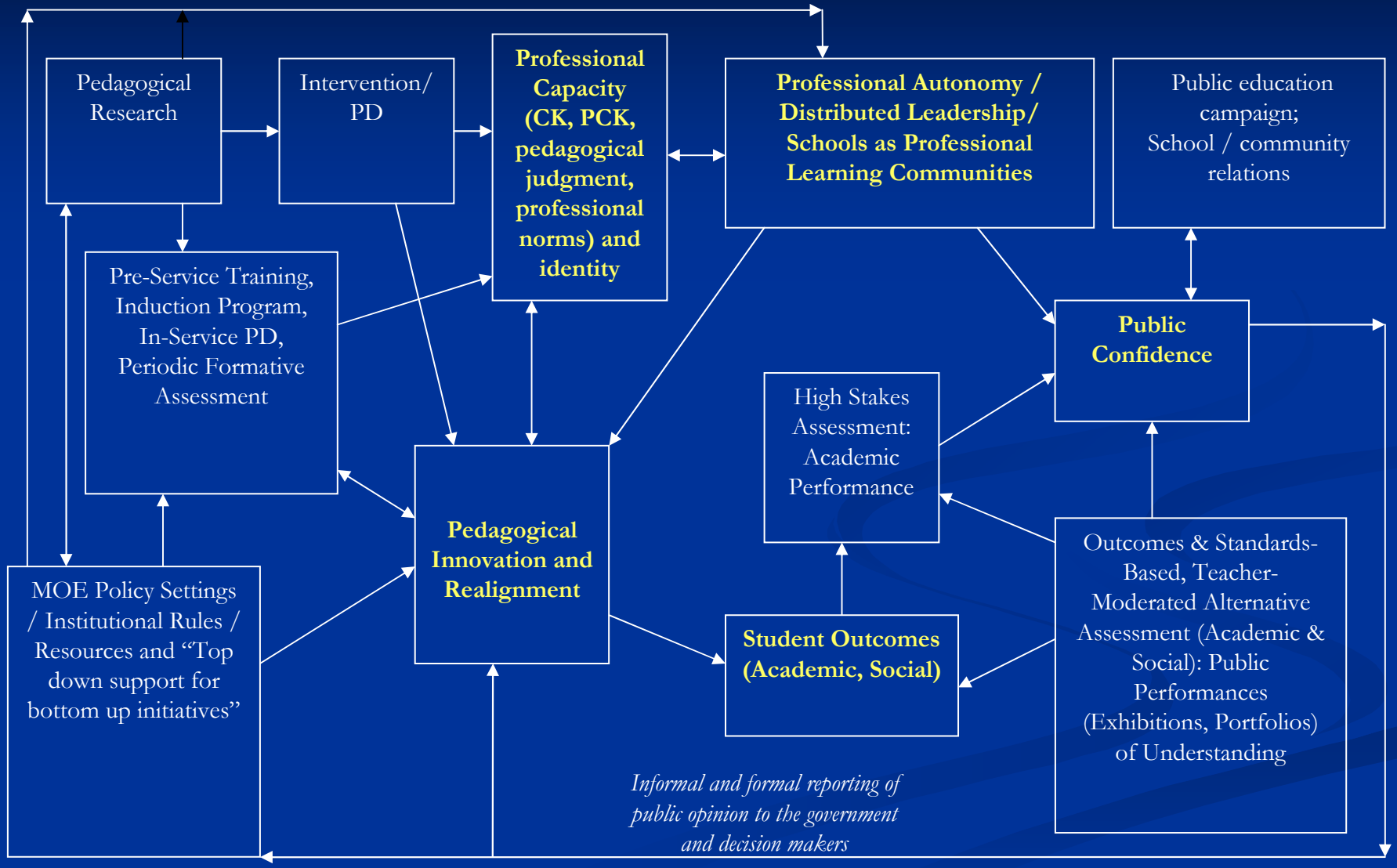
  - Popular support for meritocratic organization of schooling, including streaming and HSA, and a traditional pedagogy of knowledge transmission, drill and memorization that has delivered good examination results for many families.

- But this creates an awkward policy conundrum for the government -- a tension, on the one hand, between the kinds of pedagogical change and realignment necessary to promote improved student learning and capital formation appropriate for participation in a knowledge economy, and, on the other hand, the meritocratic policy commitments of the government and the social mobility aspirations of the population at large, on the other …

- In effect, a tension between the demands of contemporary capital formation for a knowledge economy and popular demand for meritocratic forms of social mobility

- One (my own!) possible response to the conundrum:
  - Strong emphasis on the **professionalization of teaching** in order to develop **public confidence** in the teaching profession through development of -
    - The technical skills of teachers, especially on issues of assessment and curriculum alignment
    - The professional integrity, fairness, responsibility of teachers
    - Inquiry-based reflection, decision-making and planning by teachers in schools organized as professional learning communities
  - A weakening of the tight coupling of HSA and classroom pedagogy through extensions of the number of students exempted from from HSAs and/or the development of a **mixed assessment regime** that includes a HSA system as well as moderated, multi-modal, multi-dimensional authentic assessments (AA). The two forms of assessment should be differentially weighted in ways that are politically manageable, perhaps beginning with an 80/20 weighing for 5 years, then switching to 70/30 as public confidence in authentic achievement grows)

CAPACITY BUILDING, PEDAGOGICAL REALIGNMENT AND THE LOGIC OF CONFIDENCE



- This will arguably have three positive outcomes
  - It will improve pedagogy and student learning in ways desired by the government by weakening the pressure on "teachers to teach to the test"
  - It will improve labour market efficiency (technically, "allocative efficiency) by providing a richer and more comprehensive profile of student competencies or capacities than is currently "signalled" by HSA
  - It will improve social equity (and limit formation of a permanent underclass) and improve social mobility opportunities by moderating the impact of social class background on educational achievement / attainment
- In effect, the government can have its cake and eat it too: an appropriately weighted system of HSA and AS will enhance labour market efficiency and social equity without compromising the promise of social mobility for all …

- The Singapore case is important and interesting from an international perspective because Singapore has a high stakes assessment system that is the envy of a number of governments (including federal or national governments in Australia and the US). However, the Singapore case also arguably highlights the potential opportunity costs (in terms of the capacity for significant pedagogical innovation and realignment at the classroom level) of a pedagogical system that is too tightly coupled to the assessment system. Of course there are a range of views on this matter in Singapore ...

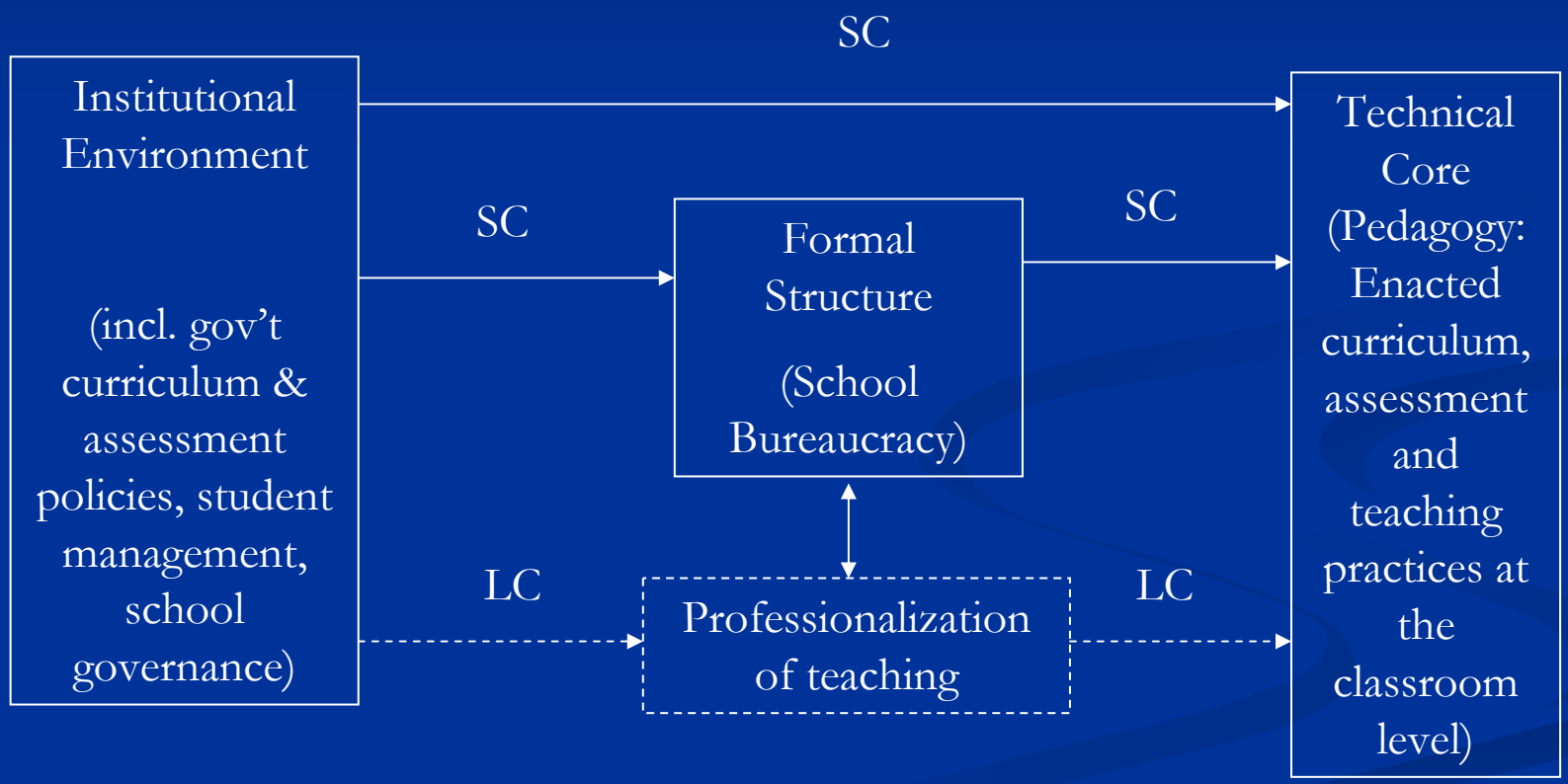
From my own perspective, however, the critical policy challenge is to find a pedagogical system that is responsive to governmental priorities, assures quality and coherence, is reliable and transparent, and has the confidence of the community, as the assessment system does in Singapore, but is also flexible enough (ie., sufficiently loosely coupled) to permit significant pedagogical innovation and promote the professionalization of teaching.

- Even more broadly, policy makers confront a 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?

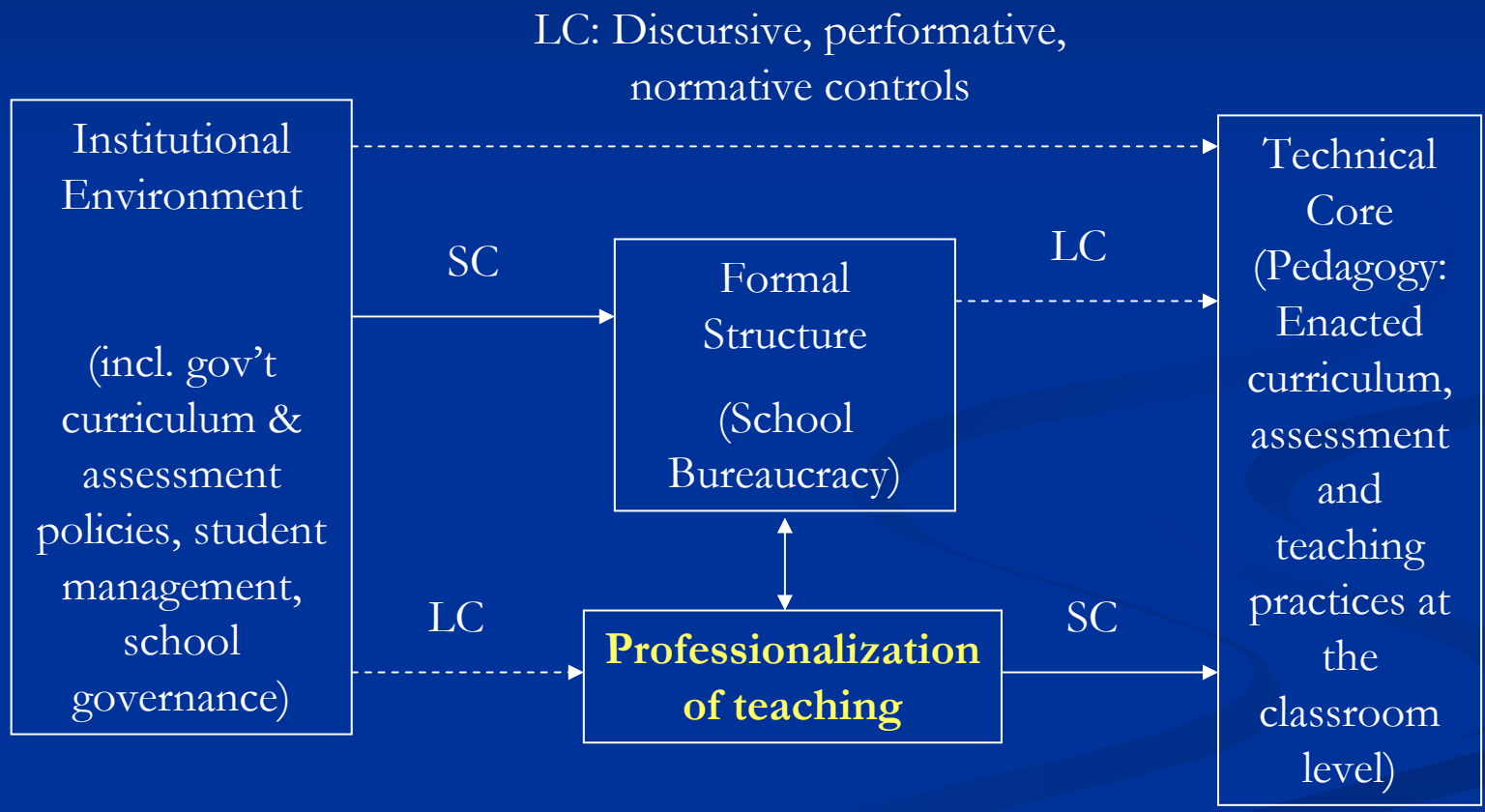
- [The following models derived neo-institutionalist organizational theory]

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



Thankyou