

From Crisis Response to Crisis Preparedness: Comparative Policy Analysis of Digital Infrastructure Governance and Educational Resilience in Uruguay and Hong Kong

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Research Overview

This comparative policy analysis examines how Uruguay's centralized Plan Ceibal and Hong Kong's decentralized teacher-led model shaped educational resilience during COVID-19. Synthesizing 25 peer-reviewed studies and structured expert consultations in both national contexts, it proposes a three-tier policy design framework for building crisis-prepared education systems aligned with SDG4 equity imperatives.

Purpose of Study

The COVID-19 pandemic disrupted education for 1.6 billion learners across 194 countries (UNESCO, 2021), exposing vulnerabilities in how education systems mobilize digital resources under crisis. While substantial research documents pandemic-era school closures, a significant gap persists: the relationship between ICT infrastructure governance architectures and educational outcomes remains undertheorized. Education-in-emergencies scholarship typically treats digital access as binary—present or absent—rather than as a policy design question involving centralization, coordination mechanisms, and institutional sequencing. Conversely, ICT policy analysis rarely connects infrastructure decisions to pedagogical outcomes or educational equity.

This study addresses that gap through two contrasting cases: Uruguay's centralized Plan Ceibal, which provided universal device access and a unified learning platform to over 85% of public school students before the pandemic; and Hong Kong's decentralized model, where schools, NGOs, and teacher-led initiatives drove adaptation with variable government coordination. The central question is forward-looking: What policy design principles can inform national strategies for building crisis-prepared education systems that advance

equitable, inclusive quality education?

Research Methods

The study employs structured comparative policy analysis (Bardach & Patashnik, 2020) integrated with systematic secondary synthesis. The evidence base comprises 25 peer-reviewed empirical studies (17 Hong Kong, 8 Uruguay) screened using seven inclusion criteria: geographic focus, COVID-19 context, digital pedagogy implementation, formal educational settings, outcomes measurement, empirical rigor, and study design. Key datasets include Vaillant et al.'s (2022) survey of 470 Uruguayan teachers, Hau et al.'s (2022) survey of 3,672 Hong Kong students and 863 teachers, and the World Bank's evaluation of Plan Ceibal (Molina et al., 2024). The secondary synthesis is supplemented by structured expert consultations with program leadership in both contexts.

The analytical framework examines three governance dimensions: (a) infrastructure provisioning—how devices, connectivity, and platforms were financed and maintained; (b) pedagogical coordination—how teaching practice and professional development were governed during remote instruction; and (c) multi-level policy integration—how local responses connected to national frameworks and international support.

Results and Discussion

Findings reveal a governance paradox. Uruguay's centralized model achieved superior infrastructure equity: 66% of lowest-income households accessed computers exclusively through Plan Ceibal (Molina et al., 2024), and platform usage scaled from 15,000 to 700,000 users. However, infrastructure equity did not ensure engagement equity—67% of teachers reported insufficient training and 72% reported increased workload (Vaillant et al., 2022), while student participation remained stratified by socioeconomic vulnerability.

Hong Kong's decentralized approach produced the inverse: inferior infrastructure equity but greater pedagogical innovation. Teachers developed blended synchronous-asynchronous models, and NGO partnerships delivered targeted socio-emotional support. Yet quality varied across schools, with new teachers and less-resourced institutions particularly disadvantaged.

The analysis supports a three-tier policy design framework: (a) centralized infrastructure provisioning ensuring universal access as pre-crisis public investment; (b)

decentralized pedagogical autonomy preserving teacher agency; and (c) coordination mechanisms connecting local innovation to national policy. The critical variable in crisis resilience is not centralization per se, but the institutional articulation between infrastructure, pedagogy, and coordination—a finding with transferable implications for education systems preparing for future disruptions.

Keywords

educational governance, digital infrastructure, crisis preparedness, comparative education policy, SDG4

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