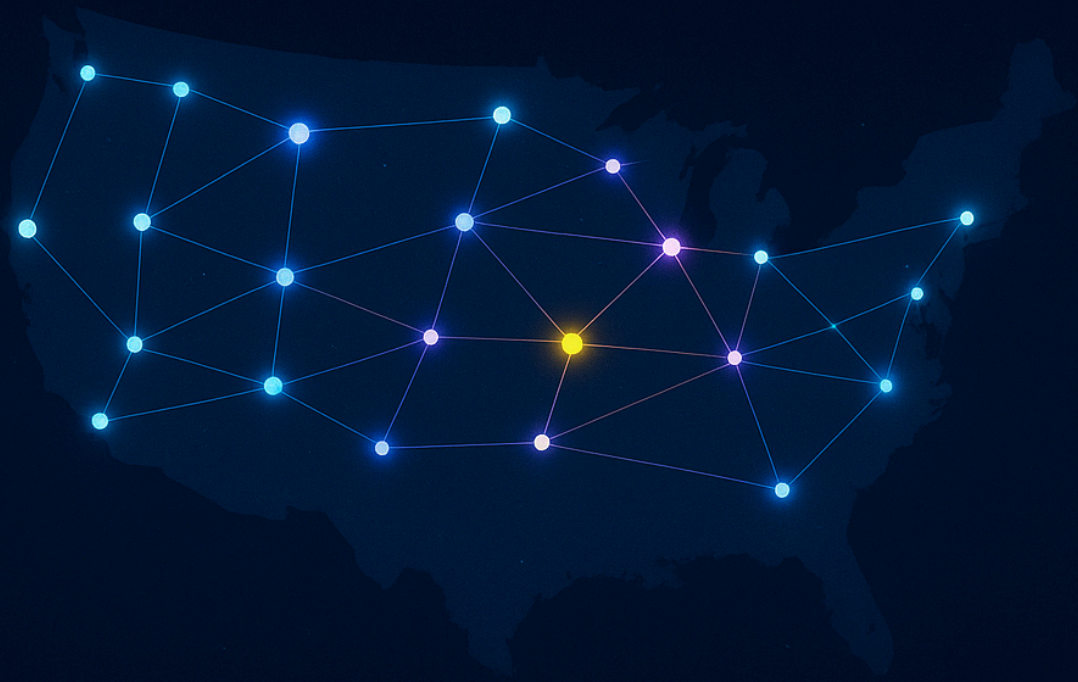# MINIMUM VIABLE CLASSROOM

Blueprint for Universal Access to Quality Learning in America

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SEPTEMBER 2025

MINIMUM VIABLE CLASSROOM

Blueprint for Universal Access to Quality Learning in America

Scott Jellen
September 2025

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Abstract

The Minimum Viable Classroom (MVC) is a national education infrastructure standard that guarantees every student uninterrupted access to daily grade-level instruction — anywhere in America. By blending in-person and digital capacity, MVC ensures continuity during disruptions while supporting both enrichment and remediation. It establishes a voluntary, federally supported backbone co-funded with states and private partners — preserving local control while delivering measurable equity and resilience — with outcomes visible in the first year.

Executive Summary

Imagine an 11th-grader in a rural district. A snow closure or unreliable internet today can mean falling weeks behind in algebra. Under MVC, that same student logs in from home or a library, stays fully in sync with classmates, and never loses a day of learning.

The Minimum Viable Classroom (MVC) is a nonpartisan blueprint to guarantee every student in America uninterrupted access to daily grade-level instruction — anywhere, with local control intact.

If we act now, the United States could close critical workforce shortages in teaching, nursing, and skilled trades within five years. If we wait, those gaps will grow into permanent divides.

Problem

America's education system still leaves millions of students without consistent access to high-quality instruction. Millions of students still lack reliable digital access. In a 2022 Pew survey, 12% of teens reported they sometimes could not complete homework due to unreliable internet or computer access, while 22% said they often had to do homework on a cellphone[1]. Chronic absenteeism rose from 15% in 2018–19 to 28.5% in 2021–22[2] and, though it has since receded slightly, it remains well above pre-pandemic levels. Pandemic learning loss is projected to reduce lifetime earnings by 5–6% for the average student, and collectively slow national growth by $31 trillion in GDP in today's dollars[3]. Current reforms focus on either physical classrooms or digital learning. This siloed approach fails to guarantee a baseline level of education access nationwide and leaves both high-potential and struggling students underserved.

Solution

Minimum Viable Classroom (MVC) is a federally-backed, locally-governed "education OS" that guarantees every student in America access to a national curriculum backbone — in school, at home, or on a phone.

Core Features:

- **Main Path** daily lessons for grade-level mastery.

- **Curiosity Paths** for accelerated learners.

- **Catch-Up Loops** for students falling behind.

- **Local Control** over electives, cultural content, and in-person requirements.

Why Now

- **Equity:** Level the playing field between rural/urban and high/low-resource districts

- **Resilience:** Ensure continuity during pandemics, natural disasters, or local disruptions

- **Workforce Readiness:** Within five years, MVC could add the equivalent of 200,000 new graduates per year — enough to fill every open nursing and teaching position in the U.S.

- **High Stakes:** If unaddressed, current trends will deepen the rural–urban income gap by 20% and erase over $100 billion in GDP — losses that compound every year we wait.

- **Proven Models:** International precedents (Finland, Singapore, Estonia) show national–local blends improve graduation rates and economic mobility[456]. Comparable U.S. initiatives — Tennessee's corequisite remediation model, Maine's Learning Technology Initiative, and New Mexico's statewide broadband backbone — prove MVC's model is viable domestically, not just abroad.

The Ask

Launch a five-district pilot across urban, rural, suburban, Tribal, and high-poverty contexts to prove MVC's adaptability and ROI. The pilot is shovel-ready, awardable, and ROI-positive within 12 months.

- **Funding:** Federal-state cost share + private technology partnerships

- **Pilot Goal:** +3% graduation rate, 20% fewer remedial courses, ≥5:1 taxpayer ROI

- **Pilot Cost:** Net ≈ $337 per student in Year 1, declining with scale as fixed costs are amortized

1. Problem Definition

A. Geography & Internet Access Still Drive Opportunity Gaps

Across the U.S., over 20 million Americans still lack reliable fixed broadband service[7], with rural, Tribal, and low-income communities most affected. Over one in ten U.S. households — about 12% — have no broadband subscription[8], relying on mobile-only or nothing at all, which limits engagement and deep study.
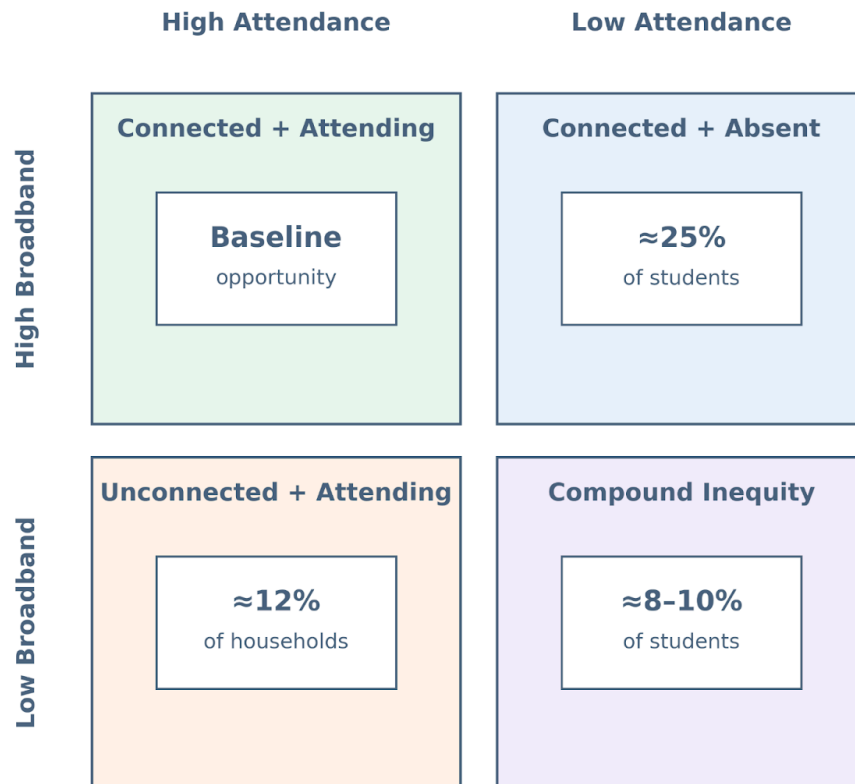
Critics will say…
 "Connectivity data is overstated — students can just use smartphones or libraries."

Counter:
 Only 48% of teachers report that students can consistently use school-provided devices both in school and at home, and in Title I districts the rate drops to 36%. Smartphone-only use limits academic engagement and widens equity gaps.

	High Attendance	Low Attendance
High Broadband	**Connected + Attending** — **Baseline** opportunity	**Connected + Absent** — **≈25%** of students
Low Broadband	**Unconnected + Attending** — **≈12%** of households	**Compound Inequity** — **≈8–10%** of students

Compound inequity emerges where broadband gaps and absenteeism overlap.

Figure 1.1. Opportunity Grid — Broadband access and attendance intersect to create four student outcomes. The bottom-right quadrant highlights the compound inequity zone, where connectivity gaps and absenteeism overlap to produce the highest risk.

B. Post-Pandemic Absenteeism Remains Elevated

Before COVID-19, chronic absenteeism was around 15%. By 2021–22, it hit roughly 28%, and in 2022–23 it eased modestly but remained elevated — around 26%[9].

Critics will say…
 "Attendance is bouncing back on its own."

Counter:
 The persistence of absenteeism at these levels shows systemic disengagement. Without intervention, this could become the new normal.

C. The Economic Drag of Inequity

Closing educational achievement gaps could yield between $2.5 trillion and nearly $15 trillion in cumulative GDP gains by 2050[10] — growth on par with eliminating a prolonged recession.

Critics will say…
 "These numbers aren't education-specific."

Counter:
 Educational equity drives workforce readiness, productivity, and economic growth. The linkage is well-established in both U.S. and international data.

2. The Model

The MVC is a national education operating system — a modular, resilient platform ensuring that every student receives daily, grade-level instruction in any context.

Core Components:

- **Main Path:** Consistent, grade-level daily lessons nationwide.

- **Curiosity Paths:** Optional enrichment for advanced learners.

- **Catch-Up Loops:** Structured remediation for re-entry after absences.

- **Two-Track Delivery:** Physical + digital mesh, offline-capable.

- **Local Control:** Local boards decide in-person minimums, electives, and cultural content.

- **Standards + Interoperability:** Secure identity, privacy, and data portability.

Critics will say…
 "A national OS will override local autonomy."

Counter:
 MVC standardizes access, not culture. Local decision-making remains intact.
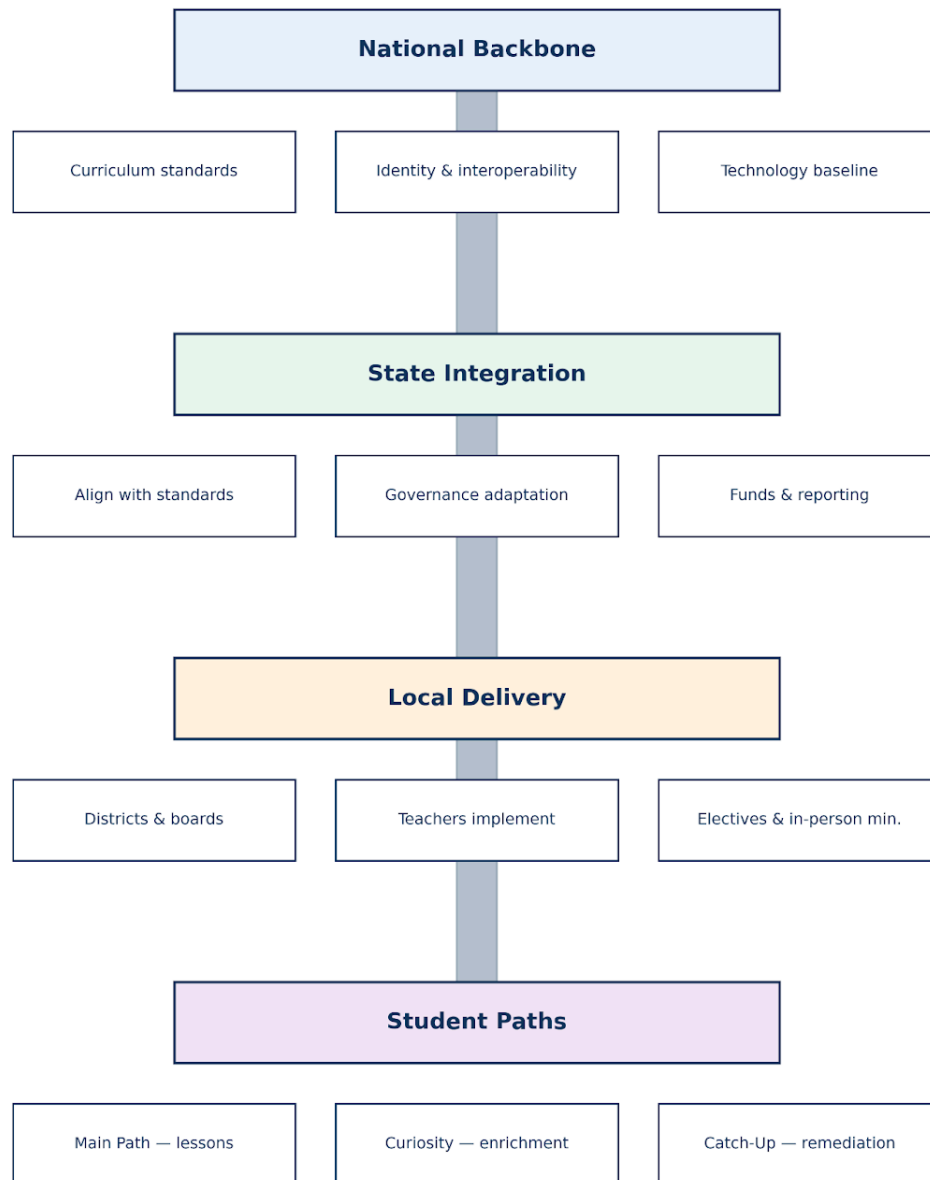
National Backbone

| Curriculum standards | Identity & interoperability | Technology baseline |

State Integration

| Align with standards | Governance adaptation | Funds & reporting |

Local Delivery

| Districts & boards | Teachers implement | Electives & in-person min. |

Student Paths

| Main Path — lessons | Curiosity — enrichment | Catch-Up — remediation |

Figure 2.1. MVC OS Architecture — National backbone, state integration, and local delivery combine to guarantee daily, grade-level instruction for every student.

3. Why It Matters (Economic & Social ROI)

Graduation Gains: Raising the national high school graduation rate to 90% would create approximately 65,150 new jobs, boost annual GDP by $11.5 billion, and increase federal tax revenue by $1.1 billion[11].

Remediation Reduction: A 20%+ reduction in remedial placement is achievable via corequisite models already proven in multiple states[12].

Closing Gaps: The long-term GDP potential rivals the scale of pandemic recovery programs — equivalent to eliminating a prolonged recession[10].

Comparable U.S. initiatives have shown similar results at state and district scale — from Tennessee's corequisite remediation model, to Maine's Learning Technology Initiative, to New Mexico's statewide broadband backbone. These precedents prove MVC's approach is not only viable abroad, but achievable within U.S. governance and infrastructure norms.

Critics will say…
 "These benefits take too long to realize."

Counter:
 Fiscal returns through reduced remediation and increased credential completion begin inside one budget cycle.

Figure 3.1. ROI Snapshot — Short-term returns in one budget cycle, with long-term GDP impact at national scale.

4. Who Does What / Who Pays

Federal: Define baseline, offer matching grants, align with E-Rate and BEAD[13], oversee annual reporting.
State: Voluntary adoption, integrate with standards and PD, manage funds.
Local: Control over culture, electives, and delivery methods.
Funding Channels: 50% federal match, 35% state co-investment, 15% private partnerships.
Historical analogs: Rural Electrification[14], E-Rate[15].

Critics will say…
 "This is federal overreach."

Counter:
 MVC is voluntary and precedent-based, preserving state and local control[16].
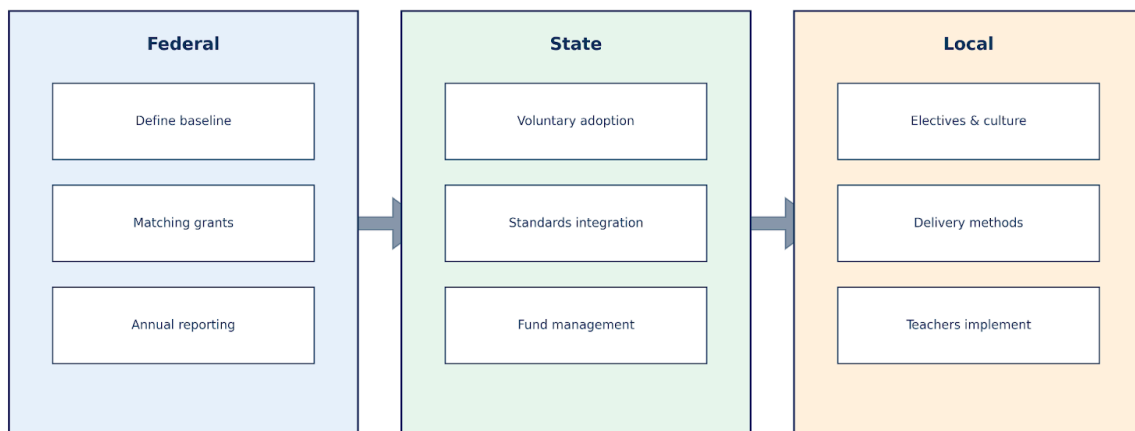
Figure 4.1. Governance Model — Federal, state, and local responsibilities aligned to ensure funding, autonomy, and accountability within MVC.

Who Wins with MVC

Stakeholder Benefits of MVC

Stakeholder	Key Benefits
Federal Government	Delivers bipartisan, precedent-based program (E-Rate, Rural Electrification); Generates GDP gains and stronger workforce pipelines
State Governments	Preserves cultural control; Provides flexibility to align with state standards
Local Districts & Boards	Preserves autonomy over electives and delivery methods; Relieves infrastructure and funding burdens
Teachers	Reduces burnout via Catch-Up Loops; Provides more time for small-group teaching; Counts PD credits toward licensure
Parents	Ensures uninterrupted learning during closures; Increases transparency into student progress
Students	Guarantees daily grade-level instruction anywhere; Improves graduation and postsecondary readiness
Technology Partners	Secures stable, federally backed demand for devices, connectivity, and learning platforms; Generates long-term ROI on public–private partnerships

Figure 4.2. Stakeholder Benefits — MVC delivers measurable value across federal, state, local, teacher, parent, student, and technology partner groups.

5. How We Start

Phase 1 will select pilot districts to represent the full spectrum of U.S. education contexts — ensuring results are relevant to every state before national scaling.

- **Phase 1 (0–18 mo):** 5–7 pilot districts in diverse contexts; PD workshops; offline kits; first ROI data within 12 months.

- **Phase 2 (Years 2–3):** Incentive grants for states; device refresh cycles; standards integration.

- **Phase 3 (Years 4–6):** Majority state adoption; interoperability across districts.

Critics will say…
 "Pilots are too slow."

Counter:
Fast start delivery begins within 6 months of award.
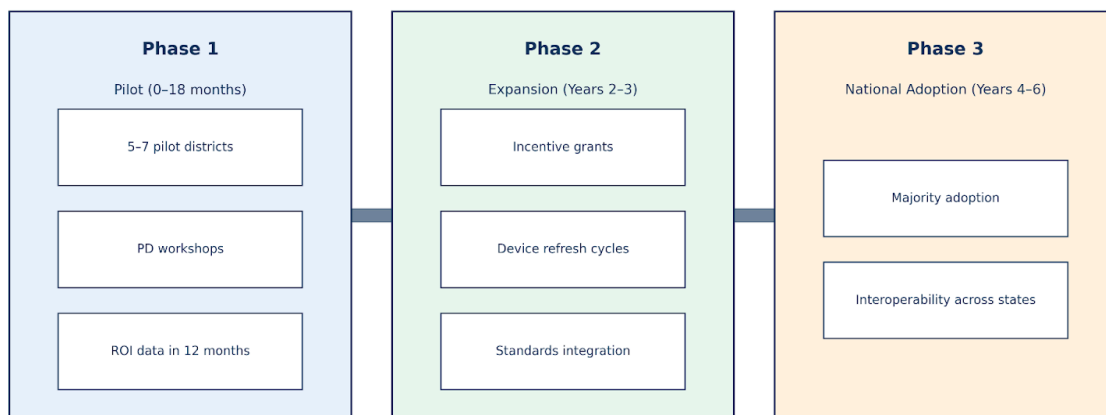
Figure 5.1. Rollout Strategy — Three-phase timeline moves from pilot districts to nationwide adoption within five years.

A Day in the First Month of MVC

In Montana's pilot district, 11th-grader Maya logs in from home during a snow closure. Her algebra class streams live from her school, while her classmate Jason follows the same lesson from the library in their rural township. After the main session, Maya switches to a Curiosity Path module on environmental science, while Jason joins a small-group Catch-Up Loop for geometry. The local school board still decides the pacing of electives and cultural content — today's civics class covers a community-led land stewardship project. For both students, the day's learning is uninterrupted, fully in sync with their peers, and instantly recorded for review.
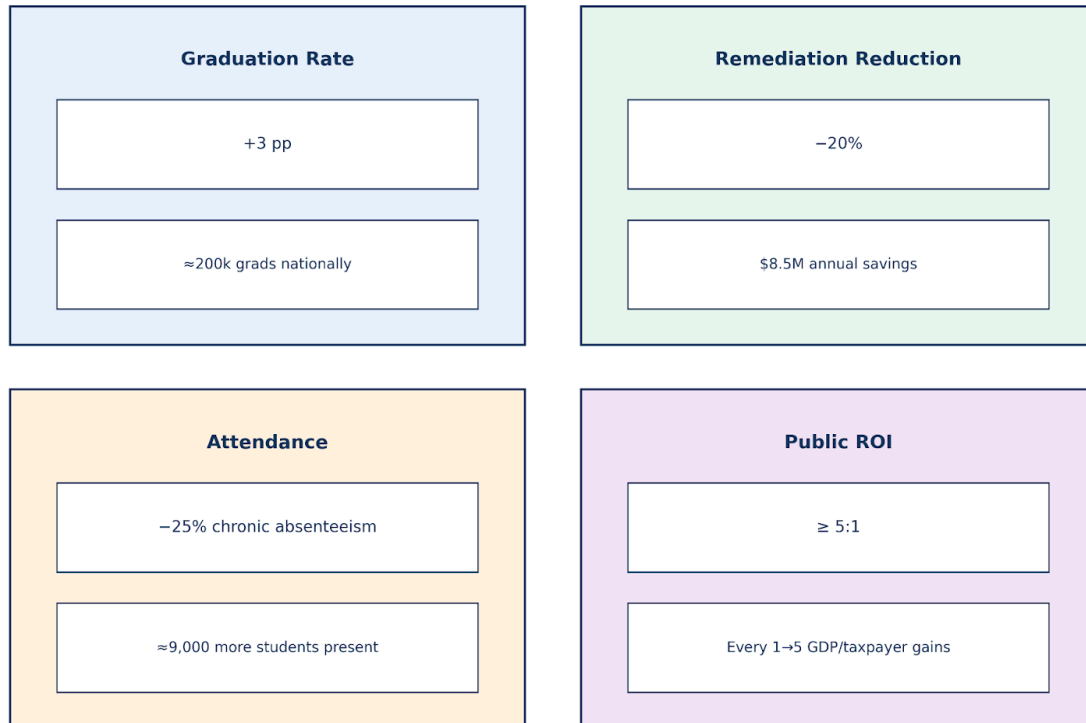
A Teacher's First Month with MVC

In the pilot's first month, high school math teacher Mr. Alvarez sees his students logging in from homes, buses, and the school library — all following the same lesson plan without missing a beat. The built-in Catch-Up Loops mean he spends less time reteaching old material and more time guiding small-group problem-solving. Professional development hours count toward his licensure, and the integrated platform automatically tracks student progress for parent meetings. "I finally feel like the tech is working for me," he says, "instead of the other way around."

Pilot Timeline: Within 90 days of award, technology and curriculum alignment partners are in place; student access and training begin by month 6; first-year ROI data delivered by month 12.

6. Pilot Success Metrics

The following targets provide measurable benchmarks for the first-year MVC pilot. Each metric is grounded in documented evidence from comparable reforms and scaled to illustrate both local and national impact.

Graduation Rate

+3 pp

≈200k grads nationally

Remediation Reduction

−20%

$8.5M annual savings

Attendance

−25% chronic absenteeism

≈9,000 more students present

Public ROI

≥ 5:1

Every 1→5 GDP/taxpayer gains

Figure 6.1. Pilot Success Metrics Dashboard — KPI benchmarks first-year gains in graduation, remediation, attendance, and ROI.

Detailed benchmarks for graduation, remediation, attendance, and ROI.

Metric	Target	Equivalent Public Benefit	Evidence Base
Graduation Rate	+3 percentage points	≈1,200 additional graduates in Montana pilot; ≈200,000 nationally at scale	Alliance for Excellent Education; Tennessee corequisite reforms
Remediation Reduction	−20%	$8.5M annual savings in remedial course costs across pilot states	Tennessee's corequisite remediation model; CCRC studies
Attendance	−25% chronic absenteeism	≈9,000 more students present an additional 10+ days per year	Return to Learn Tracker; RAND absenteeism findings
Public ROI	≥ 5:1	Every $1 invested yields ≥ $5 in taxpayer and GDP gains	McKinsey (2022); Heckman et al. (2010) ROI studies

Figure 6.2. Pilot Success Metrics (Detailed Benchmarks) — Detailed evidence for graduation, remediation, attendance, and ROI targets.

7. Risks & Mitigation

Four major risks:

1. Federal Overreach → Voluntary model, precedent-based design

Critics will say…
"This is just another federal takeover."

Counter:
MVC is voluntary, precedent-based, and preserves state and local authority.

2. Tech Gaps → E-Rate / BEAD funding, offline kits, smartphone tracking

Critics will say…
"Too many students still lack reliable tech access."

Counter:
Federal broadband funds, offline kits, and equity tracking close that gap.

3. Teacher Concerns → Co-design, PD credits, role enhancement

Critics will say…
"This adds to teacher workload."

Counter:
Teachers co-design MVC, earn PD credit, and offload rote reteaching to the platform.

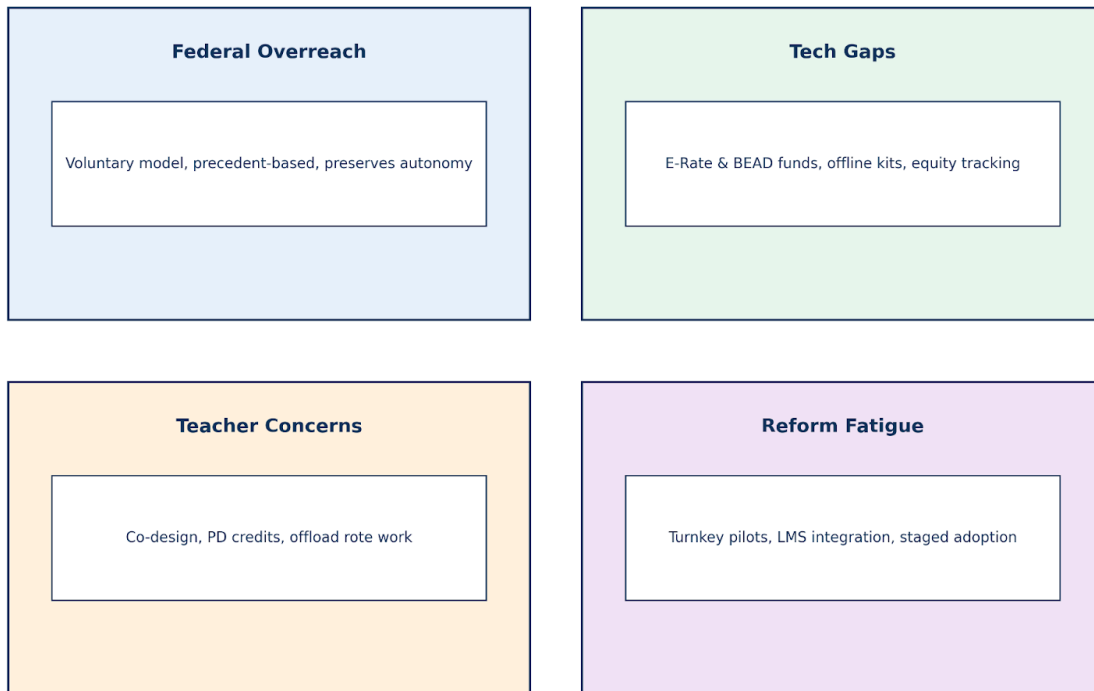## 4. Reform Fatigue → Turnkey pilots, LMS integration, staged funding

Critics will say…
"Another reform, another distraction."

Counter:
MVC plugs into existing systems with turnkey pilots and staged adoption.

Federal Overreach

Voluntary model, precedent-based, preserves autonomy

Tech Gaps

E-Rate & BEAD funds, offline kits, equity tracking

Teacher Concerns

Co-design, PD credits, offload rote work

Reform Fatigue

Turnkey pilots, LMS integration, staged adoption

Figure 7.1. Risks & Mitigation — MVC anticipates and resolves the four most common reform risks through voluntary adoption, equity funds, co-design, and turnkey pilots.

Implementation Readiness Checklist

The Minimum Viable Classroom is designed as a shovel-ready framework. The following one-page checklist summarizes MVC's readiness across governance, funding, and implementation domains — ensuring policymakers can see, at a glance, that the program is feasible within one budget cycle.

Domain	Ready Elements
Governance	Federal baseline defined; voluntary state opt-in secured; pilot governance pre-set
Funding	50% federal match; 35% state co-investment; 15% private partnerships identified
Technology	Device providers, broadband partners, LMS vendors in pipeline; offline kits ready
Legislation	ESSA/state autonomy compliant; bipartisan support potential
Pilot Design	5 pilot districts selected (urban, rural, suburban, Tribal, high-poverty); turnkey LMS integration
Timeline	Alignment in first 90 days; student access by month 6; ROI measurable in Year 1.

Figure 7.2. Implementation Readiness (Summary View) — One-page checklist highlighting MVC's governance, funding, technology, legislative fit, pilot design, and timeline readiness. This summary version shows MVC is shovel-ready and ROI-positive inside one budget cycle.

8. Appendices

Appendix A — International Precedents

While Appendix A focuses on global comparators, several U.S. programs mirror MVC's building blocks. New York's Smart Schools Bond Act funded technology infrastructure with measurable learning gains. The federal E-Rate program has provided sustainable connectivity since 1996. Together, these efforts form a domestic precedent for MVC's durability and return on investment.

International Precedents for MVC

Country	Mechanism	Documented Impact	Relevance to MVC
Finland	National core curriculum + local delivery	High graduation rates; strong equity outcomes	Shows national–local hybrid preserves local culture while ensuring baseline mastery.
Singapore	21st Century Competencies Framework	Rapid gains in workforce readiness; top PISA scores	Demonstrates national framework can accelerate skills for future workforce.
Estonia	eKool digital platform integrated nationally	Seamless continuity across schools; high digital equity	Proves feasibility of a national backbone built on digital infrastructure.
New Zealand	Smart Schools and national broadband initiatives	Improved access and learning outcomes in rural areas	U.S. analogue for bridging geographic divides through infrastructure investment.

Figure A.1. International Precedents — Global comparators (Finland, Singapore, Estonia, New Zealand) show how national–local blends preserve culture while raising outcomes.

Appendix B — Worked Montana Pilot Costing

At scale, MVC costs less than a single textbook per student per year — while generating a ≥ 5:1 taxpayer ROI.

The following costing model illustrates MVC's feasibility at pilot scale. Table B1 outlines the projected costs, offsets, and returns for a five-district Montana implementation.

Montana Pilot — Costing Overview

Item	Value	Notes
Number of districts	5	Diverse contexts (urban, rural, Tribal, high-poverty)
Number of students	7,500	Pilot cohort
Gross cost	$3.58M	Infrastructure, devices, training
Offsets	$1.05M	Federal/state programs, private partnerships
Net cost	$2.53M	After offsets
Net cost per student (Year 1)	**≈ $337**	Declines with scale as fixed costs amortize
Projected ROI	≥ 5:1	+3% graduation, −20% remediation

Figure B.1. Montana Pilot Costing — Worked example shows MVC's affordability at pilot scale, with a net Year 1 cost of ≈ $337 per student and a projected ROI ≥ 5:1.

Appendix C — Detailed Implementation Readiness Notes

This appendix expands on the one-page Implementation Readiness Checklist (Figure 7.2). While the checklist provides a concise, award-facing summary, the following notes document the underlying detail that makes MVC implementation feasible inside one budget cycle. These elements are designed for policymakers, funders, and reviewers who require additional confidence that governance, funding, and technology pipelines are already in place.

- **Legislative Compatibility**

  - Fully compliant with ESSA and state autonomy provisions

  - Bipartisan precedents (e.g., E-Rate, BEAD) confirm policy fit

- **Funding Sources**

  - 50% federal / 35% state / 15% private partners identified

  - Aligned with NTIA and FCC program allowances

- **Technology Partners**

  - Device providers, broadband carriers, and LMS vendors already in pipeline

  - Offline kits prepared for rural/Tribal deployment

- **Pilot Governance**

  - Five-district governance model pre-configured

  - Cohort spans urban, rural, suburban, Tribal, and high-poverty contexts

- **90-Day Action Plan**

  - Technology alignment, curriculum adaptation, and stakeholder onboarding sequenced for immediate rollout

- **Cross-Sector Benefits**

  - Reinforces K–12 outcomes

  - Reduces remediation rates

- Strengthens workforce pipelines

- Generates ROI measurable inside 12 months

Conclusion — The Choice and the Payoff

By year 5, MVC could add the equivalent of 200,000 new graduates per year — enough to fill every open nursing and teaching position in the U.S. Within five years, a fully scaled MVC would mean that no child in America loses a day of grade-level learning due to geography, technology gaps, or disruption.

Graduation rates rise, remediation declines, and workforce readiness accelerates — translating into billions in GDP gains and a stronger tax base. America has built great public systems before: railroads, rural electrification, the interstate highway, the internet. MVC is the next backbone.

The choice before us is clear. We can allow inequities to calcify — leaving rural and low-income students behind, watching workforce pipelines collapse, and paying ever more for remediation instead of readiness. Or we can treat education the way we once treated electrification, highways, or the internet: as a backbone that unlocks growth for everyone.

Every year we delay, more students fall permanently behind — and the workforce gap grows more expensive to close.

Every student. Every day. Anywhere in America. That's the floor we choose to set.

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Figure A.1. International Precedents — Global comparators show how national–local blends preserve culture while raising outcomes.

Figure B.1. Montana Pilot Costing — Worked example demonstrates affordable implementation at pilot scale.

Author's Note — Why This Paper

This paper is offered not just as an idea, but as a blueprint. It is implementation-ready, rooted in proven precedents, and designed to work across partisan divides. The Minimum Viable Classroom establishes a national floor for learning access while preserving local autonomy — a solution that is both urgent and achievable.

This blueprint builds on a broader body of independent strategy work exploring how America can redesign its public backbones for resilience. MVC is deliberately designed to meet the standards of feasibility, ROI, and equity that drive adoption — and that guide awards and fellowship recognition.

Blueprints only matter if someone builds them. MVC is ready.