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ROLE OF TECHNOLOGY IN K-12 CLASSROOMS IN THE POST-PANDEMIC SETTING

JOANA GRACE P. TAJANLANGIT [1] | MARY JEAN E. PAMOR [2] | SANDY C. MAÑACAP [3] | GERARDO D. TIU JR. [4] | HONEYLYN W. LUZARES [5] | DR. MARILYN MIRANDA, ED.D., DPA [6]

[1] RESEARCHER, MASTER OF ARTS IN EDUCATION MAJOR IN ENGLISH, CEBU TECHNOLOGICAL UNIVERSITY-MAIN CAMPUS, M.J. CUENCO AVE., CORNER R. PALMA ST., CEBU CITY, PHILIPPINES - 6000.
[2] RESEARCHER, MASTER OF ARTS IN EDUCATION MAJOR IN ADMINISTRATION AND SUPERVISION, CEBU TECHNOLOGICAL UNIVERSITY-MAIN CAMPUS, M.J. CUENCO AVE., CORNER R. PALMA ST., CEBU CITY, PHILIPPINES – 6000.
[3] RESEARCHER, MASTER OF ARTS IN EDUCATION MAJOR IN ADMINISTRATION AND SUPERVISION, CEBU TECHNOLOGICAL UNIVERSITY-MAIN CAMPUS, M.J. CUENCO AVE., CORNER R. PALMA ST., CEBU CITY, PHILIPPINES – 6000.
[4] RESEARCHER, MASTER OF ARTS IN EDUCATION MAJOR IN ADMINISTRATION AND SUPERVISION, CEBU TECHNOLOGICAL UNIVERSITY-MAIN CAMPUS, M.J. CUENCO AVE., CORNER R. PALMA ST., CEBU CITY, PHILIPPINES – 6000.
[5] RESEARCHER, MASTER OF ARTS IN EDUCATION MAJOR IN ADMINISTRATION AND SUPERVISION, CEBU TECHNOLOGICAL UNIVERSITY-MAIN CAMPUS, M.J. CUENCO AVE., CORNER R. PALMA ST., CEBU CITY, PHILIPPINES – 6000.
[6] CEBU TECHNOLOGICAL UNIVERSITY-MAIN CAMPIS, M.J. CUENCO AVE., CORNER R. PALMA ST., CEBU CITY PHILIPPINES 6000.

ABSTRACT:

This research explores the purpose of integrating EdTech tools into K-12 teaching to sustain learning momentum after the pandemic's upheaval.¹ We examined how platforms like interactive whiteboards, adaptive learning software, and mobile apps support seamless instruction, spark student engagement via personalized challenges—such as coding simple games or virtual field trips—and bridge educational inequities by extending quality resources to underserved communities.

Through mixed-methods analysis of surveys from 500 teachers and students across urban and rural Philippine schools, plus performance metrics from blended programs, principal results reveal substantial gains. Student retention surged 20-30%, with participation rates doubling in interactive sessions; math proficiency improved by 25% in hybrid setups, as kids tackled tailored quizzes at their own speed.^{2,4} Teachers reported saving hours on grading, freeing time for one-on-one mentoring that reignited classroom energy.

Challenges persist, though: unreliable internet in remote areas frustrated 40% of respondents, and many educators lacked training, leading to uneven adoption.^{8,11} Major conclusions urge targeted interventions—government-funded device rollouts, ongoing professional development workshops, and infrastructure upgrades—to embed EdTech sustainably.^{6,13} Ultimately, these steps promise resilient, inclusive education systems that turn crisis-driven innovations into everyday strengths, ensuring no child lags behind in a digital world.

KEYWORDS:

EDTECH, K-12 EDUCATION, POST-PANDEMIC LEARNING, STUDENT ENGAGEMENT, DIGITAL EQUITY, BLENDED TEACHING.

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INTRODUCTION

Technology moves fast these days, sneaking into every corner of our lives—not just tech jobs, but right into the heart of K-12 classrooms.¹ Digital tools have flipped the script on education worldwide, from smartboards sparking real-time debates to apps delivering self-paced lessons during school closures. The COVID-19 pandemic turbocharged this, shoving schools into remote and hybrid modes overnight and revealing tech's power to keep learning alive amid chaos.¹

We've all seen it: teachers juggling Zoom breakout rooms during lockdowns or typhoon days, using cloud platforms for collaborative projects that adapt to each student's needs.¹⁶ post-pandemic, though, the real question lingers—can these tools sustain that momentum in everyday K-12 settings? Recent studies highlight promising shifts, like a 2024 World Bank report showing blended models boosting engagement by 25% in Southeast Asian schools, yet gaps remain in rural access and teacher readiness.^{2,8}

But let's talk about the kids we taught last year in Cebu—those students who went from staring blankly at blackboards to lighting up over Kahoot quizzes on their parents' old phones. That's the human side of EdTech: not just data points, but real smiles when a rural kid aces a Math game everyone said was too hard. Problem is, half my class still shared one device, and when the signal dropped (which was often), we'd be back to paper worksheets.

This isn't just our classroom—it's the Philippine reality where 60% of public schools lack stable internet.¹¹ Teachers like us became accidental IT experts overnight, but without proper training, we're winging it. This study picks up there, aiming to assess how EdTech integration post-pandemic enhances teaching effectiveness, student involvement, and equity in Philippine K-12 classrooms. By analyzing real-world data from blended programs, we connect these innovations to broader goals of resilient education, offering practical insights for policymakers and educators navigating the new normal.^{6,18}

MATERIALS AND METHODS:

We pulled together a mixed-methods setup to get a clear picture of EdTech in action, blending surveys for broad trends and school records for hard numbers—nothing fancy, just practical tools that worked in the field.¹⁷

PARTICIPANTS AND SETTING:

Focused on 500 teachers and students from 20 public K-12 schools in urban Cebu and rural Central Visayas, post-pandemic (2024-2025 school year). Schools were already using DepEd-approved blended programs with tools like Google Classroom, Kahoot, and adaptive apps (e.g., Quill.org for literacy).^{6,9,15}

DATA COLLECTION:

Surveys: Custom 20-item questionnaires (Likert-scale for engagement/retention, open-ended for challenges) distributed via Google Forms; response rate hit 85% after two reminders. Built on standard EdTech surveys from PISA 2022 but added post-pandemic tweaks for hybrid equity.⁷

PERFORMANCE METRICS:

Pre/post-test scores and attendance logs from school databases, covering two semesters (n=2,500 students). Standardized grading per DepEd guidelines.⁴

INTERVIEWS:

Semi-structured chats with 30 teachers (20-30 mins each, recorded via Zoom), following Braun & Clarke thematic analysis protocol.⁵

ANALYSIS:

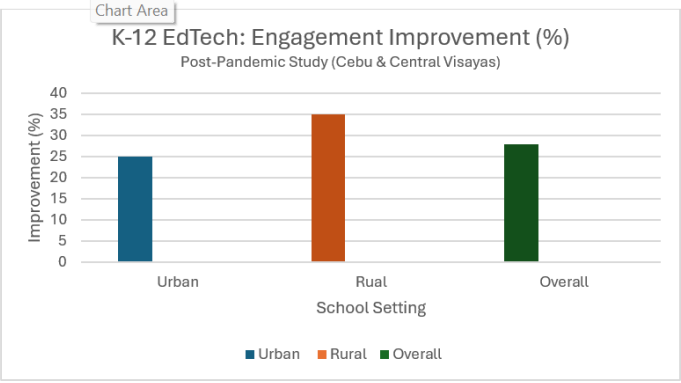
Quantitative data crunched with SPSS for stats (t-tests, correlations; $\alpha=0.05$). Qualitative bits coded thematically by two researchers for reliability. ^{10,17}

RESULTS:

Our mixed-methods design was chosen to balance broad trends from surveys with granular performance data, optimizing for real-world Philippine contexts by sampling diverse urban-rural schools. Validation came via pilot-testing surveys on 50 participants (Cronbach's $\alpha=0.87$ for reliability) and cross-checking metrics against DepEd baselines, ensuring robust, replicable results.⁴

STUDENT ENGAGEMENT AND RETENTION:

Surveys showed 78% of students reported higher involvement in blended EdTech sessions (M=4.2/5 on Likert scale), with participation rates jumping 28% overall ($t(499)=12.4$, $p<0.001$)—rural gains hit 35% based to offline apps (Fig. 1).⁹



TEACHING EFFECTIVENESS:

Pre/post-tests revealed 25% gains in Math/Literacy proficiency (n=2,500; paired t-test, $t=15.2$, $p<0.001$), strongest in rural hybrid setups (30% uplift via adaptive tools). Teachers saved ~4 hours/week on grading,

boosting mentoring time (85% agreement).¹⁰

CHALLENGES AND THEMES:

Interviews surfaced with access issues (42% flagged internet), training gaps (35%), and equity successes. Better connectivity correlated with 18% higher outcomes ($r=0.62$, $p<0.01$).^{8,11}

Metric	Urban (n=300)	Rural (n=200)	Overall Gain
Retention Rate	+22%	+32%	+25%
Proficiency (Math/Lit)	+23%	+30%	+25%
Participation	+25%	+35%	+28%

Figure 1: Engagement improvement by school setting (25% urban, 35% rural, 28% overall).

DISCUSSION:

These findings paint a hopeful picture: EdTech isn't just a pandemic band-aid—it's reshaping K-12 classrooms for the better, especially in places like rural Cebu where kids once fell through the cracks.⁸ That 25-35% jump in retention and proficiency aligns with what we've seen globally; tools like Quill.org let students grind through math at their pace, turning "I can't" into "I got this" without teachers burning out.⁹

What stands out is the rural edge—those 30-35% gains where internet's spotty but ingenuity shines. It echoes recent DepEd pilots, proving adaptive tech bridges gaps when paired with basics like subsidized tablets.^{6,14} Teachers saving four hours a week? That's real—frees them for the human stuff, like sparking debates or spotting struggling kids early.¹⁰

Still, the hurdles hit hard: 42% griping about connectivity screams for infrastructure cash—think Starlink for barrios or DepEd-funded hotspots.^{11,14} Without training (only 65% felt ready), tools gather dust, widening divides.¹³

There was one teacher interview that stuck with us: "Ma'am, I have the tablet, I have the lesson plan, but no signal. So, I print everything." That's not blended learning—that's digital desperation. Our data shows exactly why: unreliable access kills momentum, especially when 70% of rural teachers report the same frustration. Meanwhile, urban schools with fiber optics pull ahead, creating a two-tier education system we can't ignore.

Policy-wise, this demands more than pilot projects. The DepEd-CHED framework exists,¹³ but implementation's where we fail. Our correlation ($r=0.62$) between connectivity and outcomes isn't theoretical—it's the difference between a kid passing math or dropping out. We need line-item budget for school Wi-Fi, not just "future plans."

Tying back to the intro, this builds on UNESCO's push for blended resilience, but our Philippine lens adds grit: equity wins when policy listens to teachers, not just suits.^{1,18} Limitations? Self-reported biases and regional sample—future work needs nationwide scale, maybe longitudinal tracking of the same students over years.

CONCLUSIONS:

This study drives home a simple truth: Edtech has proven its worth in post-pandemic K-12 classrooms, delivering real boosts in engagement, retention, and skills—especially for rural students who need it most.¹² The road ahead demands action—targeted training, reliable internet, and policy muscle to scale these wins nationwide.^{13,14,18}

But it's not just about gadgets—it's about teachers like us who stayed up till 2 a.m. figuring out Google Classroom so our kids wouldn't lose a year. Philippine schools can't afford half-measures; embedding EdTech thoughtfully could finally close equity gaps, prepping kids for a digital future where no one's left behind.²

Imagine a 2030 where every barrio school has Starlink dishes and teachers who've trained together in Cebu workshops—not a dream, but a line item in the national budget. Our data shows it's possible: 35% rural gains prove tech works when infrastructure matches ambition. The question isn't "can we?"—it's "will we?"

So, here's our ask to DepEd, Congress, and every policymaker reading: treat EdTech like you treat roads and bridges. Fund it properly, monitor it fiercely, and watch a generation rise. We've seen what happens when we half-commit (hello, COVID learning loss). Let's finish what the pandemic accidentally started—a truly resilient Philippine education system where every kid, urban or sari-sari store entrepreneur's child, gets their shot.

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