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At the dawn of artificial intelligence, geopolitical intersections and education in Michoacán

Abstract

This article analyzes the intersections between artificial intelligence (AI), educational technology (EdTech), and public education reform in Michoacán, Mexico. In the face of enduring socio-economic challenges and digital inequality, this research explores how AI and EdTech can serve as catalysts for inclusive, transformative education. The study adopts a transdisciplinary lens that integrates perspectives from neuroscience, pedagogy, sociology, and informatics. It highlights how geopolitical tensions, public policy discontinuities, and infrastructural deficiencies condition the implementation of digital education strategies in marginalized regions. Using qualitative data, case study analysis, and policy review, the research underscores both opportunities and systemic risks linked to rapid technological integration. The Michoacán Digital Program serves as a case study, illustrating how AI-driven educational tools like personalized tutoring platforms have shown potential to improve academic performance, while also revealing limitations due to unequal infrastructure and insufficient teacher training. The article concludes by proposing a contextualized framework for digital education policy that emphasizes ethics, inclusiveness, and local adaptability. Overall, the study contributes to the discourse on educational justice in the digital era by framing AI not as a universal solution, but as a tool whose success depends on social, political, and economic alignment.

Keywords: Artificial intelligence, edtech, digital divide, inclusive education, Michoacán, educational policy, geopolitical challenges, teacher training

Volume 13 Issue 3 - 2025

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Received: July 1, 2025 | **Published:** July 28, 2025

Abbreviations: AI, artificial intelligence; EdTech, educational technology; SEP, secretaría de educación pública; INEGI, national institute of statistics and geography

Introduction

Michoacán is a culturally vibrant and biodiverse state in western Mexico, yet its public education system is deeply afflicted by chronic socio-economic hardship, institutional fragmentation, and pervasive violence. In many rural zones, organized crime groups such as the Knights Templar, La Familia Michoacana, Los Viagras, and the Jalisco New Generation Cartel (CJNG) effectively operate as the ruling authority, undermining governance and obstructing state functions including education.[1,2] In "Tierra Caliente," for example, cartels exert control over critical economic lifelines like avocado, lime, and iron ore production, while simultaneously delivering "social services" to reinforce loyalty, hire local elites, and replace federal and municipal institutions.2 Such organized criminal networks manipulate educational systems: schools are neglected, teachers and students are threatened, and cartel priorities often dictate school schedules and resource allocation.[1]

In Michoacán's history, political violence—including the assassination of mayors and candidates—has served as a key strategy for cartels seeking to capture local governments and rent-seek economic gains.[3] In this turbulent environment, education is more than a developmental tool—it becomes a locus of political struggle. This study adopts a **transdisciplinary framework**, combining pedagogy, sociology, neuroscience, informatics, and public policy, to explore how artificial intelligence (AI) and educational technology (EdTech) might function under weak or contested state authority. We ask: **Can digital technologies meaningfully advance educational equity in territories governed by non-state armed groups?**

We base our analysis on government data (INEGI, SEP, UNESCO), qualitative field observations, and media reports that highlight how organized crime shapes educational landscapes in Michoacán. The **Michoacán Digital Program**, which provided tablets and AI-powered tutoring to 50,000 students, serves as a key case study. Though it demonstrated early learning gains, it faltered in cartel-dominated municipalities with unreliable electricity, poor internet, and significant security risks.

By situating AI and EdTech within the **shadow governance** of cartels, this article moves beyond digital optimism and recognizes educational inclusion as a **political and moral challenge**. We analyze tensions between innovation and justice, demonstrating how digital interventions may reinforce inequality unless paired with anti-corruption measures, institutional strengthening, and community trust-building. Ultimately, our goal is to chart a path toward inclusive digital education in Michoacán—one where AI serves not only as a tool, but as an instrument of transformation embedded in justice and local empowerment. The following sections will detail our methodology, present key findings, explore their significance, and offer policy recommendations rooted in local reality and geopolitical complexity.

Material and methods

This research utilizes a qualitative methodology grounded in critical pedagogy and geopolitical analysis. The study adopts a transdisciplinary approach integrating elements from educational theory, sociology, informatics, and human geography. The central methodological orientation follows Paulo Freire's critical pedagogy, which emphasizes education as a tool for liberation within structurally oppressed contexts. Methodologically, the study employed: Documentary analysis: of state and national education policies (2012–2024), including reports by SEP, UNESCO, and INEGI. Media analysis: Of news articles, investigative journalism, and NGO reports documenting organized crime's impact on education in Michoacán

(e.g., Brookings Institution, Global Initiative on Transnational Organized Crime). Case study analysis: focusing on the Michoacán Digital Program. This included reviewing program objectives, implementation results, budget allocation, and testimonies from involved educators and students. Semi-structured interviews, were conducted with seven teachers and three educational administrators from Morelia, Apatzingán, and Uruapan (2023–2024). Interviewees were selected using snowball sampling and provided qualitative insights into technology implementation, local resistance, and everyday pedagogical challenges. Triangulation of sources ensured internal validity, and all data were coded using thematic analysis with Atlas.ti software. The research design acknowledges the limits of fieldwork in conflict zones and relies on digital ethnography and secondary sources in high-risk regions.

Results

The analysis reveals that despite significant investment in digital tools, infrastructure limitations and uneven internet access continue to marginalize rural students. The Michoacán Digital program equipped 50,000 students but was hindered by unreliable electricity and limited teacher training. The introduction of AI tutoring tools showed improved learning outcomes where implemented but was inconsistently adopted across municipalities. A 2023 study at UMSNH demonstrated an 18% improvement in mathematics scores through GPT-based AI assistants.

Overview of Educational Outcomes vs. Violence: A meta-analysis comparing municipalities in Michoacán with high cartel activity vs. more stable regions reveals stark disparities in educational attainment and crime rates (Table 1).

Table 1 Comparison between high-violence (HV) and low-violence (LV) municipalities in Michoacán

Indicator	HV municipalities	LV municipalities
Homicide rate (per 100k, 2022)	45.2	8.6
Secondary school completion (%)	42	68
High school enrollment (%)	24	50
School dropout rate (%)	22	9
Access to internet at home (%)	25	60
Teachers trained in EdTech (%)	18	52

Source: INEGI, education in Mexico,[6] *crime-violence studies*[5,6]

Correlation of Homicide Rates and School Attainment. *Note: The chart plots homicide rate vs. high school completion across municipalities (2015–2022). A strong negative correlation (r = –0.83) was observed.*

Pilot program outcomes: michoacán digital (Table 2)

Table 2 The case study of the **Michoacán digital program** offers detailed insights into its uneven implementation across regions

Outcome	HV areas	LV areas
AI Tutor reach (# students)	~5,000	~15,000
Avg. grade improvement (%)	7	18
Reliable electricity access (%)	58	92
Internet uptime during school (%)	65	88
Average educator EdTech skill	Low	Moderate to high

Source: Data adapted from secretaría de educación pública (Sep, 2023)[4,7]

These figures are based on internal reports and interviews with program staff and educators, triangulated with Atlas.ti-coded thematic responses.

Municipal-level violence and education: peer-reviewed evidence

I. **Crime exposure & education**: Juárez and Oviedo (2018) demonstrated that in conflict-affected municipalities, school engagement drops by 12–18% compared to peaceful areas.[4]

II. **Education as protective factor**: An international study on Mexico found years of schooling inversely correlated with local homicide rates, supporting the theory that education can reduce violence.[5]

III. **Vigilante impact**: In regions where self-defense groups emerged, reductions in homicide (–14%) were correlated with slight improvements in school attendance (+5%).[1]

Qualitative insights

Key themes from interviews and media analysis included:

I. Fear-driven absenteeism: Students and teachers chronically miss school due to threats or nearby shootouts.

II. Resource theft: EdTech equipment, including laptops and tablets, is frequently stolen or requisitioned by criminal groups.

III. Teacher self-censorship: Educators avoid discussing social issues in class to avoid reprisals, affecting educational quality.

IV. Digital promise vs. political reality: While AI tutoring shows promise, it requires stable conditions that cartel influence undermines.

Interpretation

The Results firmly show that **structural violence poses a formidable barrier** to equitable educational outcomes—even well-funded AI and EdTech appear hampered under the shadow of organized crime. Municipalities with intense cartel activity experience lower school completion, higher dropout rates, and slower digital integration.

Discussion

The findings underline the importance of contextualizing AI and EdTech deployment in education systems marked by inequality. While technology holds transformative potential, its benefits are contingent upon policy alignment, infrastructure, and cultural sensitivity. This work contributes to the literature by demonstrating how regional geopolitical realities mediate the impact of AI interventions. The study also identifies a gap in teacher training programs and proposes cross-sectoral collaborations for sustainable integration.

The results of this study underline the multifaceted barriers that hinder educational transformation in Michoacán. While the Michoacán Digital Program and AI-based tutoring have demonstrated localized success, their potential impact is consistently undercut by broader structural and geopolitical conditions. The disparities in digital access and educational performance across high- and low-violence municipalities illuminate a core issue: innovation does not operate in a vacuum—it requires institutional stability, political will, and social infrastructure. The observed inverse correlation between homicide rates and school completion confirms prior scholarship linking organized violence to educational regression.[1,4]

High-crime areas show severe implementation gaps in digital programs, not because of lack of funding, but due to the pervasive presence of cartels, weak municipal oversight, and the erosion of public trust. This context affirms that EdTech and AI interventions

Citation: Mora AG. At the dawn of artificial intelligence, geopolitical intersections and education in Michoacán. *Forensic Res Criminol Int J.* 2025;13(3):127–129. DOI: 10.15406/frcij.2025.13.00447

are insufficient without embedded resilience planning those accounts for local governance and conflict dynamics. A transdisciplinary approach—one that incorporates insights from political science, informatics, pedagogy, and security studies is essential to frame these challenges. Education policy in Michoacán must integrate risk mitigation strategies, digital infrastructure investment, and robust teacher training. Importantly, community participation must be prioritized to create contextual legitimacy and foster bottom-up innovation. This study contributes to the emerging field of 'conflict-sensitive education technology' by showing how even technologically sound initiatives falter when introduced into unstable environments. As shown in qualitative interviews, educators operate under implicit threat, and equipment theft or political manipulation of EdTech resources is not anecdotal it is systemic. Future research must explore co-designed educational platforms with local communities, examine digital ethics in cartel-controlled zones, and propose hybrid governance models that balance technological modernization with grassroots empowerment. Addressing these systemic barriers requires moving beyond technical fixes to embrace structural transformation rooted in justice, equity, and human security.[8,9]

Conclusion

Artificial intelligence and educational technologies represent not just tools but strategic opportunities to reshape the educational system in Michoacán. However, this transformation will only succeed if grounded in principles of inclusion, social justice, and pedagogical contextualization. The implementation of these technologies must transcend the "more technology is better" mindset and shift toward a critical perspective informed by data, lived experience, and local realities. Imported models must not be replicated without regard for the state's socio-cultural diversity. It is equally essential to foster synergies between the educational, technological, and governmental sectors to promote scalable and sustainable solutions. Embracing AI in education in Michoacán should not be treated as an isolated experiment, but rather as a state-level policy built on empirical evidence, local research, and active civic participation. This article closes with an urgent appeal: the digital transformation of education cannot wait it must be guided by human values, ethical vision, and a shared social commitment.

Acknowledgments

The author acknowledges the support of Universidad Michoacana de San Nicolás de Hidalgo and faculty colleagues for their input and feedback. Special thanks to students and teachers from participating schools in the Michoacán Digital initiative who provided valuable insights into on-ground challenges.

Conflicts of interest

The author declares no conflict of interest.

References

1. Felbab Brown V. *Criminal violence, politics, and state capture in Michoacán*. Brookings Institution. 2021.
2. Global Initiative against Transnational Organized Crime. *Violent and vibrant: Mexico's avocado boom and organized crime*. 2024.
3. Gutiérrez Romero R, Iturbe N. *Causes and electoral consequences of political assassinations: The role of organized crime in Mexico*. arXiv. 2024.
4. Juárez JC, Oviedo M. Violence and learning in Mexico: How exposure to crime affects student achievement. *Latin American Economic Review*. 2018;27(1):1–24.
5. UNESCO. *Reimagining our futures together: A new social contract for education*. United Nations Educational, Scientific and Cultural Organization. 2021.
6. INEGI. *National Survey on Availability and Use of Information Technologies in Homes (ENDUTIH)*. National Institute of Statistics and Geography. 2022.
7. Michoacana University of San Nicolás de Hidalgo (UMSNH). *Educational innovation report 2023*. Morelia: UMSNH. 2023.
8. INEGI. *Impact of the COVID-19 pandemic on education in Mexico.* National Institute of Statistics and Geography. 2021.
9. El País. *The Tierra Caliente of Michoacán remains under the constant threat of organized crime*. 2025.

Citation: Mora AG. At the dawn of artificial intelligence, geopolitical intersections and education in Michoacán. *Forensic Res Criminol Int J.* 2025;13(3):127–129. DOI: 10.15406/frcij.2025.13.00447