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PERCEPTIONS AND PATHWAYS TO AI INTEGRATION

Investigating K-12 Teachers Readiness for AI in the Classroom

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Authors
Stephen Aguilar
Rosie Le Xiu
Maimoona Junjunia
Reem Al-Sulaiti
Selma Talha-Jebril

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Ministry of Education and Higher Education
State of Qatar • دولة قطر

USC University of Southern California

USC Rossier
School of Education

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Foreword

Artificial intelligence is reshaping every sector of society, and education lies at the heart of this transformation. As nations prepare their youth for an increasingly digital and AI-enabled future, teachers play a pivotal role in ensuring that technology strengthens, rather than replaces, their expertise, judgment, and role as cultivators of critical and ethical thinkers. Preparing the teaching workforce to navigate and harness AI is therefore a foundational requirement for future-ready education systems.

This WISE study, Perceptions and Pathways to AI Integration: Investigating K-12 Teacher Readiness for AI in the Classroom, conducted in collaboration with the University of Southern California (USC) across five countries including Qatar, offers a timely and nuanced perspective on this challenge. By listening to the voices of more than a thousand K–12 teachers and examining both their individual experiences and the enabling conditions around them, the research moves beyond abstract debate to show how GenAI tools are already being used—most frequently in lesson planning—and where practice still lags behind potential, especially in student-facing applications. It also underscores that "enabling environments, such as institutional support, infrastructure access, and professional development, play a critical role in fostering teacher enthusiasm and translating it into meaningful classroom practice," while highlighting teachers' ethical concerns related to academic integrity, creativity, data privacy, and equity.

Qatar's participation reflects our national commitment to innovation and lifelong learning as pillars of Qatar National Vision 2030. Empowering teachers with the skills and ethical awareness to leverage emerging technologies aligns closely with the Ministry of Education and Higher Education's 2024–2030 Strategy, Igniting the Spark of Learning, which prioritizes personalized learning and seeks to equip teachers with the tools and training needed to use AI in ways that are both effective and deeply human. Within Qatar Foundation's Pre-University Education, AI is similarly embedded as a key enabler in our strategy 2040, guiding how we rethink curriculum, assessment, and support systems to further personalize learning and better serve all learners The study's identification of systems such as Qatar and Colombia as "institutionalized adopters" reminds us that policy frameworks, infrastructure, and professional learning are essential, but must be continuously strengthened to ensure that every learner—regardless of background or school context—benefits from AI in meaningful and equitable ways.

As Qatar accelerates its work in digital transformation and future-skills development, this research sharpens our understanding of how to design and implement national AI capacity-building initiatives. It calls on us to build clear GenAI literacy frameworks for teachers, invest in robust and equitable infrastructure, reinforce institutional support, and embed sound academic-integrity and ethical guidelines. Above all, it encourages us to position GenAI as a creative partner in pedagogy, not a shortcut—supporting teachers to design richer, more inclusive learning experiences while keeping human relationships, values, and wellbeing at the center. We are grateful to WISE, our partners at USC, the ministries and institutions that enabled this work, and especially the teachers who shared their insights. Their voices will guide our next steps as we continue to foster ethical, inclusive, and human-centered AI adoption in education.

Abeer Al Khalifa
President of Pre-University Education (PUE)
Qatar Foundation

Executive Summary

As generative artificial intelligence (GenAI) continues to reshape education systems across all levels, its integration into K–12 classrooms demands urgent and nuanced investigation. The growing availability of GenAI tools has sparked global interest; however, the pace and nature of adoption remain uneven globally and across different education contexts. While these tools offer promising administrative efficiencies, instructional enhancements, and personalized learning opportunities, their actual impact depends on how teachers perceive, access, and apply them in daily practice.

Most existing research has focused on national case studies, leaving a gap in understanding the broader global implications for K–12 educators. Conducted by the World Innovation Summit for Education (WISE) at Qatar Foundation in collaboration with the University of Southern California (USC) Rossier School of Education and the USC Center for Generative AI and Society, the study described in this report spans five countries: Qatar, Colombia, the Philippines, India, and the United States. Each country represents distinct education infrastructures and policy environments.

Using a mixed-methods approach, the study paired survey data from 1,405 teachers with in-depth semi-structured interviews from 26 teachers. The study's findings reveal four emerging themes:

1. **GenAI readiness drives adoption.** Teachers with greater GenAI readiness, indicated by higher confidence, perceived usefulness, and previous experience, tend to have more positive views on GenAI's role in education. Support from institutions boosts this positivity.
2. **GenAI integration is concentrated in planning, not pedagogy.** GenAI use is heavily concentrated in lesson planning (71–91% across countries), but translation to classroom practice lags significantly. Teachers use GenAI extensively behind the scenes but rarely use it directly with students. This gap stems from infrastructure constraints, policy uncertainty about student use, and underdeveloped pedagogical frameworks for student-facing applications.
3. **Ethical concerns increase with expertise.** Paradoxically, teachers most skilled with GenAI express the strongest concerns about its potential to hinder creativity and enable plagiarism. Teachers across all five countries voice ethical concerns but lack systematic strategies for addressing them, indicating uncertainty rather than rejection.
4. **Literacy gaps reflect systemic deficits.** Teachers from non-traditional preparation pathways show markedly lower GenAI readiness. Language barriers limit non-English-dominant teachers' effectiveness with predominantly English-trained GenAI systems. Professional development remains inconsistent, with infrastructure obstacles (unreliable internet, limited devices) preventing even well-trained teachers from implementing what they've learned.

Cross-Country Findings: Three Patterns of GenAI Integration

Findings from the cross-country analysis show three distinct national trajectories in GenAI integration by teachers:

- **Institutionalized Adopters (Colombia and Qatar):** Colombia and Qatar demonstrate the most advanced integration trajectories. In these countries, teacher use of GenAI is reinforced by strong institutional and policy support, including explicit national strategies, professional development frameworks, and resource allocation for classroom implementation. Teachers in both countries report high confidence and frequent use of GenAI for lesson preparation and instruction.
- **Literacy-Based Innovators (Philippines):** GenAI literacy emerged as a national strength with the teachers surveyed in the Philippines. However, these individual capacities outpace institutional infrastructure. Limited access to devices, inconsistent professional development, and unclear policy directives have constrained the translation of GenAI literacy into widespread practice.
- **Cautious Experimenters (India and United States):** Teachers in India and the United States expressed moderate optimism about GenAI instructional potential and are beginning to integrate it in selected areas, yet adoption remains uneven. School-level implementation often depends on local leadership or individual initiative rather than coordinated national strategy. Despite positive attitudes toward innovation, limited institutional coherence and unequal access are slowing wider adoption and transformation.

Policy Recommendations

- **Institutionalize GenAI professional development.** Embed GenAI digital literacy in pre-service training and in-service training (continuous professional development). National credentialing frameworks should reflect these competencies, with "bridging workshops" for teachers from non-traditional pathways.
- **Align infrastructure with ambition and practice.** Reliable broadband and device availability is a prerequisite. Conduct infrastructure audits to identify specific gaps and establish minimum standards for GenAI-ready technology access.
- **Develop context-specific frameworks.** Institutionalized adopters should deepen equity focus and expand from planning to classroom integration. Literacy-focused innovators must prioritize urgent infrastructure investment. Cautious experimenters need coordinated professional development and clear policy frameworks to address fragmentation.
- **Establish continuous monitoring and evaluation.** Create national mechanisms to assess teacher readiness, track institutional support, and evaluate GenAI's impact on learning outcomes to inform iterative policy improvements.

Conclusion

This study's findings reveal that teacher readiness requires coherent policies, institutional backing, and a culture that empowers innovation in practice. Additionally, confidence, ethical understanding, and creative application thrive when enabled by clear guidelines, structured professional development training, and dependable infrastructure. Education systems that intentionally connect professional development, digital access, and guidance on responsible GenAI use are most effective at applying technology advances to impactful classroom practices. Creating this alignment between teachers' skills and instructional goals is important for unlocking GenAI's potential to promote smart, equitable, innovative, efficient, and lifelong learning.

1. Introduction

GenAI tools powered by large language models (LLMs) are widely used in everyday classrooms globally. Their use is rapidly expanding yet remains an active area of investigation, specifically in terms of how these tools are being adopted and with what consequences for teaching and learning. Early research indicates that GenAI can reduce teachers' workloads, personalize learning pathways, and give students instant access to current information. However, these benefits are not guaranteed and depend heavily on how teachers engage with the tools.

At the same time, GenAI tools carry inherent risks. Misuse or overuse can lead to increased plagiarism, diminished student creativity, and a gradual erosion of professional expertise. These concerns are valid and widespread, but they are also deeply contextual, shaped by the country, region, school, and classroom in which GenAI is being used. Despite the global nature of GenAI innovation, there is a lack of standardization in policy frameworks and a lack of information about how teachers are using GenAI and how that usage is affecting students.

Equipping teachers with the mindset, skills, and tools to integrate GenAI responsibly and effectively into their practice is essential for preparing future-ready students. As classrooms evolve in response to GenAI-driven change, teachers must be supported to develop GenAI literacy, not only to teach about GenAI but also to harness its potential to enhance their own work. This includes using GenAI tools to save time, personalize instruction, and design more engaging, student-centered learning experiences.

This report describes a study conducted by WISE (Qatar Foundation), the USC Rossier School of Education, and the USC Center for Generative AI and Society to explore how K–12 teachers across five countries engage with GenAI in their teaching and learning practices. As GenAI tools increasingly permeate within education systems, understanding how teachers perceive, adopt, and are supported in using these tools is essential for shaping equitable and context-specific integration strategies.

WISE (https://wise-qatar.org)

2. Study Scope and Objectives

The study aimed to provide a foundational, cross-country perspective on GenAI readiness by examining both individual teacher experiences and the systemic conditions that enable or constrain adoption. It focused on five culturally and structurally diverse countries: Qatar, Colombia, the Philippines, India, and the United States. Each country represents different stages of GenAI policy development, infrastructure access, and pedagogical innovation.

Five research questions guided the study:

1. **Teacher Readiness and Adoption Drivers:** What factors (such as confidence in using GenAI, prior exposure to GenAI tools, and school encouragement) predict teacher GenAI readiness and positive attitudes toward GenAI integration, and how do these factors vary across contexts?
2. **From Planning to Practice:** What technological and institutional obstacles prevent teachers from moving beyond using GenAI for drafting lesson plans to using GenAI in the classroom, and where do supportive structures (funded subscriptions, mentorship programs) already exist?
3. **Ethical Concerns and Expertise:** What factors explain variations across countries in teachers' concerns about student plagiarism and diminished creativity, and how much of that variation stems from policy gaps versus individual training backgrounds?
4. **Literacy Development and Professional Learning:** What GenAI literacy gaps exist across contexts, what professional development structures support or constrain teacher learning, and how do training pathways shape readiness?
5. **Context-Specific Policy Pathways:** What targeted, context-specific policies can ministries, school districts, and international bodies adopt to promote equitable, effective GenAI integration while safeguarding academic integrity and creativity?

WISE (https://wise-qatar.org)

3. Methodology

The study used a mixed-methods approach, combining survey and interview data to explore teacher readiness and understand system-level enablers. Together, these data form a narrative of how GenAI is being negotiated in day-to-day school use and identify the policy levers that can make emerging practices sustainable.

3.1 Sampling and Study Population

The study engaged 1,405 K–12 teachers from five countries: Qatar, India, Colombia, the Philippines, and the United States. The teachers represented a range of grade levels from early childhood to secondary education. They varied in gender, years of experience, and professional training backgrounds.

Sampling was conducted randomly within regions where research partners had established networks and could engage with ministries of education, schools, and teachers on the ground.

Table 1: Pathways to recruitment

Pathways to Recruitment				
Qatar	**Colombia**	**India**	**Philippines**	**United States**
Ministry of Education and Higher Education and Pre-University Education (PUE), WISE	Local partner, San José de Las Vegas School, WISE	Local partner, Centre for Teacher Accreditation (CENTA), WISE	Local partner, Centre for Teacher Accreditation (CENTA), WISE	Individual schools, USC

3.2 Data Collection Instruments (Quantitative)

A 40-item survey was administered to 1,405 teachers, designed using established motivation and learning theories (see Appendix A). The survey was translated into Spanish and Arabic and administered in English in the United States and the Philippines. The survey measured three factors:

- **GenAI readiness:** Confidence, perceived usefulness, and prior hands-on experience.
- **Institutional support:** Perceptions of school-level encouragement and access to resources.
- **Belief dimensions:** Optimism about GenAI's instructional value, concerns about plagiarism, and fears regarding student creativity.

3.3 Semi-Structured Interviews (Qualitative)

As part of the mixed-method methodology, semi-structured interviews were conducted with 26 teachers (four to seven per country) via Zoom, lasting 20–30 minutes each. The interview protocol (see Appendix B) explored three areas:

- **GenAI literacy knowledge:** How teachers conceptualize GenAI literacy and their role in developing GenAI literacy among students.
- **Pedagogical integration:** Concrete applications of GenAI in lesson preparation and classroom teaching, and how teachers balance GenAI suggestions with pedagogical expertise.
- **Barriers and support systems:** Challenges teachers face, including connectivity, language, policy ambiguity, and equity concerns, and the institutional support and professional development they need.

Table 2: Number of participants

Number of Participants						
	Qatar	Colombia	India	Philippines	United States	Total
Public School Teachers	257	40	92	66	466	**921**
Private School Teachers	27	125	224	35	73	**484**
Survey Participants (N = 1,405)	284	165	316	101	539	**1,405**
Interview Participants (N = 26)	5	5	5	4	7	

3.4 Data Analysis

Survey data were analyzed using regression models to statistically determine predictors of different belief outcomes, controlling demographics, training pathways, and country. School type (public/private) were not statistically significant predictors.

Interview transcripts were analyzed through a two-phase coding process. The first phase used predefined categories aligned with survey constructs (e.g., GenAI readiness). The second phase identified emergent themes inductively (e.g., ethical framing, prompt engineering skills). Triangulating quantitative and qualitative findings provided a more comprehensive understanding of both generalizable trends and context-specific perspectives of teachers.

Triangulation of quantitative and qualitative data enabled a comprehensive understanding of both broad cross-country patterns and nuanced teacher perspectives.

3.5 Study Limitations

While the study employed a rigorous mixed-methods design and drew on diverse global contexts, several limitations should be considered when interpreting its findings and generalizability.

- **Participant representation:** Teachers across all countries voluntarily participated in the study with varying seniority levels, subject expertise, digital literacy, and school-level socioeconomic conditions. This variance may limit generalizability.
- **Temporal scope:** As a cross-sectional study, data were collected at a single point in time. The report does not make causal claims and should be interpreted as a snapshot rather than a trajectory.
- Self-reporting limitations: As with all self-reported data, teachers may tend to overemphasize ethical compliance or underreport challenges, especially given the sensitivity and polarization surrounding GenAI in education.
- **Contextual coverage:** Although the five countries represent diverse education systems, they do not encompass the full range of global GenAI integration efforts.
- **Language and translation:** Interviews were primarily conducted in English, with translation support provided where necessary. Differences in language proficiency and cultural interpretation may have affected response accuracy and direct comparability across contexts.
- **Technology evolution:** Given the rapid pace of GenAI development and policy change, the findings represent an early-stage baseline. The tools and conditions described may evolve significantly in the near future.

4. Cross-Country Comparative Analysis

This section presents a comparative analysis of teacher perspectives and practices across the five countries, highlighting both shared trends and contextual divergences in GenAI adoption. The findings reveal that while teachers globally recognize GenAI's potential to enhance teaching and learning, their experiences and levels of institutional support vary widely, shaped by local infrastructure, policy environments, and pedagogical teaching cultures.

The analysis identifies three distinct national trajectories in GenAI integration: **Institutionalized Adopters** (Qatar, Colombia), **Literacy-Focused Innovators** (Philippines), and **Cautious Experimenters** (United States, India). These patterns highlight that successful GenAI adoption depends on enthusiasm, literacy, and the alignment between institutional support, equity, and pedagogical integration.

4.1 Three National Patterns of GenAI Integration

Institutionalized Adopters (Qatar, Colombia) demonstrate strong alignment between policy support, infrastructure, and teacher practice. Teachers in Qatar (86% institutional support, 76% frequent use) and Colombia (70% institutional support, 73% frequent use) benefit from explicit national strategies, professional development frameworks, and reliable technology access. This comprehensive backing enables advanced applications beyond basic lesson planning, with both countries showing high equity focus (47% in both) and strong ethical engagement (Qatar 53%, Colombia 67%).

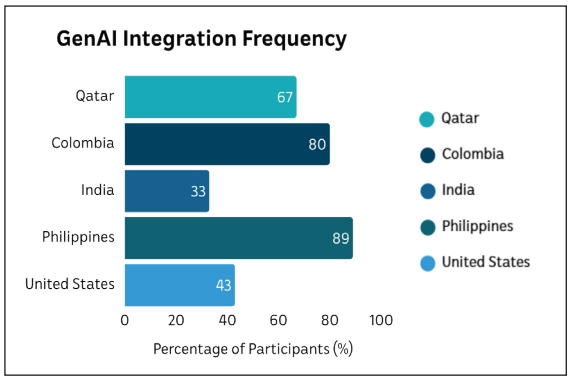
Literacy-Focused Innovators (Philippines) present a paradox of capacity constrained by circumstance. Teachers display the highest literacy training rates (89%) and strong ethical awareness (67%), yet only 32% report receiving institutional support. Chronic infrastructure barriers (unreliable internet, limited devices) prevent translation of individual capacity into widespread practice. Despite 83% enthusiasm, only 11% report equity-focused GenAI applications, revealing how infrastructure gaps undermine even strong teacher readiness.

Cautious Experimenters (United States, India) reflect fragmented approaches with moderate optimism but uneven support. The United States shows 60% GenAI usage but only 47% institutional support and 43% literacy training, with the lowest ethical awareness (38%) among all countries. India presents higher institutional support (75%) and enthusiasm (80%), but literacy training remains uneven (33%), and infrastructure varies dramatically between urban and rural settings. In both countries, school-level implementation depends heavily on local leadership rather than coordinated national strategy.

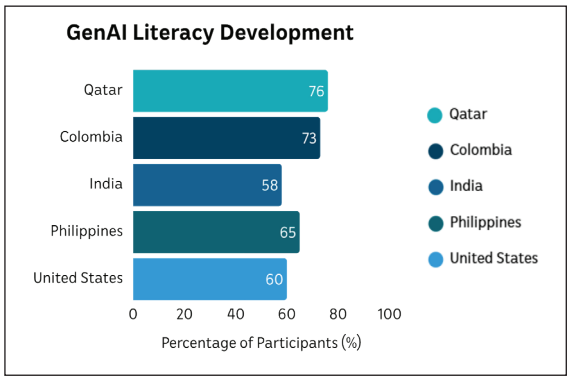
4.2 Cross-Country Differences Mapped Across Six Key Dimensions

Findings from the comparative analysis reveal distinct patterns across six dimensions: GenAI integration frequency, literacy development, student engagement and equity, institutional and policy context, exploration attitudes and, risks and ethical concerns.

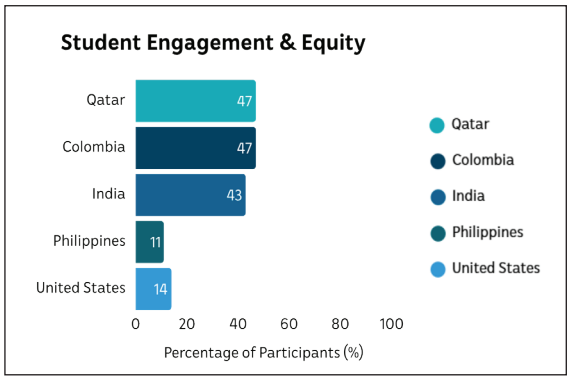
GenAI Integration frequency, defined as how often teachers actually use GenAI in daily instruction, shows a visible divide across countries. Teachers in Qatar (76%) and Colombia (73%) report using GenAI most frequently, signaling strong momentum to embed such tools into routine classroom use. By contrast, usage in the United States (60%) and India (58%) remains comparatively modest, suggesting that GenAI has not yet become a regular classroom tool.



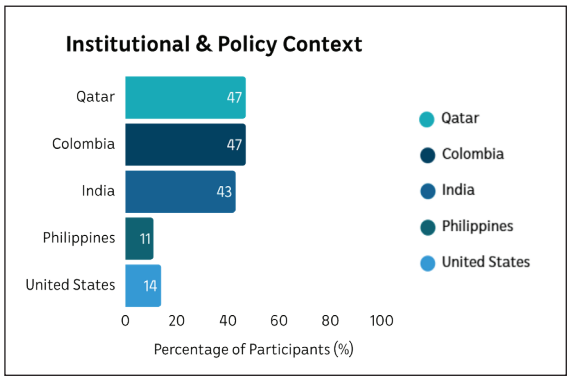
GenAI literacy development is defined by how much professional development and training teachers received on GenAI, including concepts such as prompt engineering and ethical use. Teachers in the Philippines (89%), Colombia (80%), and Qatar (67%) report robust GenAI literacy initiatives. By contrast, far fewer teachers in the United States (43%) and India (33%) feel equipped, pointing to a clear need for targeted training programs.



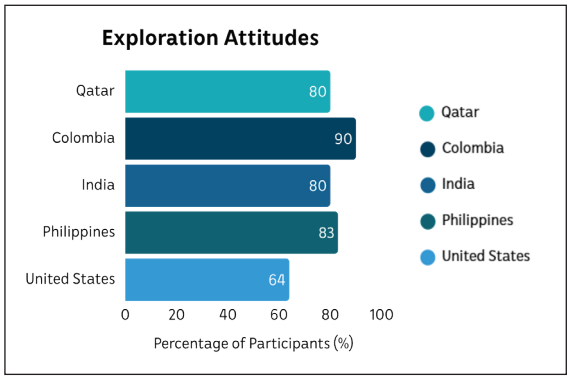
Student engagement and equity, measuring how well GenAI use translates into inclusive and engaging learning experiences for students, shows the most uneven results: Qatar (47%), Colombia (47%), and India (43%) show relatively strong efforts to design GenAI-enabled activities that reach all students. In contrast, the United States (14%) and the Philippines (11%) barely mention equity-driven strategies, even where overall GenAI literacy or integration levels are high.



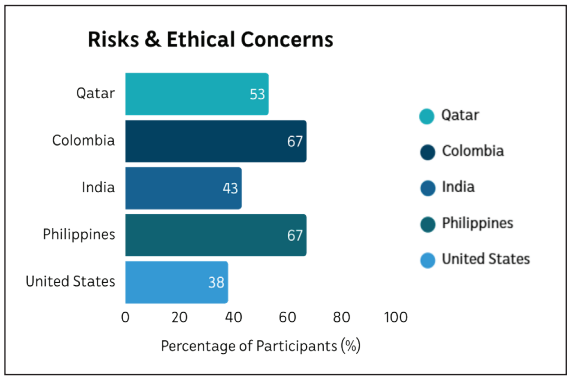
Institutional and policy context, defined as formal institutional support from schools and ministries, remains inconsistent. In Qatar (47%), Colombia (47%), and India (43%), teachers report at least moderate support, with some access to guidance, professional development, or institutional frameworks that validate their experimentation. In contrast, teachers in the United States (14%) and the Philippines (11%) describe being largely on their own, relying on personal initiative rather than policy direction.



Exploration attitudes, defined as enthusiasm for experimentation with GenAI in teaching, is almost universal. Teachers in Colombia (90%), the Philippines (83%), India (80%), and Qatar (80%) show openness to trying new GenAI tools and finding ways to integrate them into their classrooms. The one exception is the United States (64%), where teachers appear more cautious. This difference likely reflects the country's broader public debate about data privacy, academic integrity, and the risks of overreliance on emerging technologies.



Risks and ethical concerns are highly varying, with teachers in Colombia (67%), the Philippines (67%), and Qatar (53%) standing out for actively discussing fairness, bias, and student well-being in their reflections on GenAI use. In India (43%) and the United States (38%), these conversations are less visible, suggesting that while experimentation is underway, the ethical dimensions of GenAI use have not yet become a regular part of professional dialogue.



These divergent patterns highlight where policy intervention is most needed: strengthening teacher training in the United States and India, adding equity-focused guidance in the Philippines, and sustaining the integrated, equitable approach already underway in Qatar and Colombia.

5. Teacher Experiences: Emerging Themes

The three national patterns and six dimensions outlined above establish *what we observe* about the landscape of GenAI integration across countries. However, patterns alone do not explain *why or how* GenAI adoption occurs differently across countries.

To examine why and how these differences occur, the study included regression analyses that controlled for key variables. By controlling for individual, pedagogical, ethical, and professional factors, the regression analyses revealed trends in GenAI adoption. The following section describes four themes emerging from those trends, indicating possible explanations for the differences in GenAI adoption across countries.

5.1 Teacher GenAI Readiness and the Foundations of Adoption

Across all five countries, regression analyses showed that GenAI readiness—the combination of confidence, perceived usefulness, and familiarity with GenAI tools—is the single strongest predictor of teachers' belief that GenAI can positively impact teaching instruction. Teachers who reported higher GenAI readiness also tended to use GenAI more frequently, and this usage reinforced their optimism.

5.1.1 Geographic Variations in Teachers' Enthusiasm

Overall, teachers' enthusiasm for GenAI varied across countries, reflecting differing levels of exposure, policy environments, and institutional readiness. In Qatar and India, a higher proportion (80%) of teachers expressed optimism about GenAI's role in education. By contrast, only 54% of U.S. teachers expressed enthusiasm, and the Philippines similarly reported more cautious attitudes. Regression analyses show that teachers in Qatar and India were more likely to associate GenAI with positive education outcomes compared to their counterparts in other countries, even when accounting for demographic and professional factors.

Infrastructure and institutional support create these geographic variations. The stark contrasts between countries spotlight how systemic conditions are shaping individual teachers' readiness.

Qatar

In Qatar, teachers operate within supportive and well-resourced environments for GenAI integration. All teachers surveyed in Qatar reported reliable access to devices and high-speed internet, enabling use of GenAI tools. One engineering teacher noted, **"We're lucky that we have policies about using technology in our school. It was sent to all schools to create a safe, thoughtful place where students can learn and ask and trust."**

Institutional support is widespread, with 86% of teachers indicating their schools actively encourage GenAI use through training, mentorship, and policy guidance. This infrastructure allows teachers to focus on higher-order concerns like ethical use and prompt engineering rather than basic access. As one fifth-grade digital learning teacher explained, **"When the school provides us with training opportunity and resources, I feel confident to try AI in my class."**

However, interview excerpts reveal nuances regarding student access. One engineering teacher described his students' experience:

> **"Yes, I think they have [access to internet and applications], but not everyone [can access] because Internet connection for students is limited. Especially for high-school level students, [when] they are doing projects that require help from AI tools, they don't have access because the school rules do not allow them to use these tools."**

Despite this limitation, because basic access is guaranteed for teachers, teachers in Qatar can develop sophisticated GenAI-enabled practices.

Colombia

In Colombia, infrastructure and institutional support are steadily expanding. Seventy percent of teachers report receiving some form of GenAI-related support, often through workshops or access to tools. One technology teacher shared, **"Through teacher training programs, the Copilot tool has been very helpful, and it was the school that introduced it to us."** GenAI usage is high, with 73% of teachers integrating it into instruction and 80% reporting literacy training. Ethical awareness is also strong, with 67% of teachers actively discussing fairness and bias. While support is described as "occasional" rather than systematic, the alignment between infrastructure, teacher readiness, and ethical reflection positions Colombia as a promising institutionalized adopter.

Philippines

By contrast, in the Philippines, GenAI literacy emerged as a national strength, although these individual capacities outpace institutional infrastructure. Teachers reported the highest literacy training rates (89%) and strong ethical awareness (67%), but only 32% say their schools provide any GenAI-related support. One biology teacher described the situation: **"Sadly, the education here does not have a lot of resources, even our computer laboratories are not that, you know, not that functional."** Another teacher added, **"Not all of the students have cell phones or laptops... some have... some don't."** Broadband access is unreliable, with one public school teacher noting, **"We didn't have access with Internet connection... we're limited to the offline services only."** These constraints mean that despite 83% of teachers expressing enthusiasm, infrastructure gaps prevent widespread application.

United States

In the United States, 60% of teachers use GenAI and 43% report literacy training, yet institutional support is limited, with only 47% indicating their schools provide structured guidance. One kindergarten teacher remarked, **"Our school would say teachers can use AI to generate lesson plans or newsletters, but there's no system behind it."** Teachers often rely on personal initiative, navigating GenAI integration without coordinated support. This fragmentation contributes to inconsistent practices and heightened uncertainty. The decentralized nature of the U.S. education system means support varies dramatically by district, school, and individual administrator, leaving many teachers uncertain about what is permitted or encouraged.

India

In India, 75% of teachers report institutional support, often through digital certifications and frequent training; however, literacy development and infrastructure support remain uneven. One computer science teacher explained, **"We are all certified [Google] Gemini teachers... the school keeps upgrading us."** Despite this support, only 33% of teachers report receiving literacy training, and 58% use GenAI regularly. Enthusiasm remains high at 80%, and teachers perceive GenAI as a tool rather than a replacement. However, the fragmented policy environment and inconsistent access to devices and connectivity limit broader transformation, with urban schools often well-equipped while rural settings face significant barriers.

5.1.2 Individual Factors Shaping Teacher Readiness

Beyond GenAI readiness and institutional support, several other factors contributed to teacher optimism, though with smaller effects.

Teachers who used GenAI regularly tended to view it more favorably, suggesting that hands-on experience reinforces positive perceptions. English-language confidence also played a role, as teachers comfortable with English showed higher optimism, particularly in non-English-dominant contexts.

Formal teacher preparation emerged as another positive factor. Teachers with university-based training were more likely to express optimism, and this effect interacted with GenAI readiness.

Demographic factors showed no meaningful impact. Interestingly, age, gender, and years of experience had no correlation with GenAI optimism or adoption once readiness, support, and usage patterns were accounted for. These findings challenge assumptions about "digital native" teachers and suggest that capacity can be developed at any career stage when appropriate support exists.

5.1.3 Key Takeaways

Findings reveal that while individual teacher readiness is the strongest predictor of adoption, readiness itself is not randomly distributed. It develops through the interaction of formal preparation, hands-on experience, language capacity, and critically, the enabling conditions of infrastructure and institutional support. Teachers in well-supported countries (Qatar 86%, India 75%) develop readiness faster than equally capable teachers in unsupported countries (Philippines 32%, United States 47%), demonstrating that capacity-building requires system-level investment, not just individual initiative.

5.2 Integration in Practice: From Planning to Pedagogy

Having established how readiness develops through the interaction of individual capacity and systemic conditions, we now turn to how teachers translate readiness into practice. This emerging theme showcases what teachers do with GenAI tools and where pedagogical application succeeds or stalls.

5.2.1 Lesson Planning: The Dominant Use Case

Across all five countries, lesson planning emerged as the dominant application of GenAI. All teachers surveyed in Colombia, Qatar, India and the United States reported using GenAI to draft lesson plans, create rubrics, or generate activity ideas. In the United States, 71% of teachers used GenAI for lesson planning, while 91% of teachers in Qatar did so. The frequency of GenAI use accounts for nearly half of the variation in teachers' positive beliefs about GenAI's classroom benefits, and the majority of that use stems directly from planning-related activities.

A teacher who teaches technology in grades one to three in Colombia describes GenAI as a powerful time-saver: **"A prompt can produce a complete set of activities,"** noting that automating some tasks frees them to focus more on student interaction. In India, teachers reported using GenAI to generate full lesson scripts, specifying grade level, duration, learning outcomes, and vocabulary to maximize output quality. **"The more specific my prompt, the better my plan,"** one English teacher observed, emphasizing the link between prompt engineering and pedagogical usefulness.

Teaches in Qatar framed GenAI as a creative partner rather than a shortcut, using it to design different writing prompts and adapt units for diverse students. **"It's like a co-author that gives me scaffolds I can refine,"** one teacher noted. Teachers in the Philippines also praised GenAI's efficiency. **"It can draft a full plan in under a minute,"** one teacher noted, but stressed that **"the teacher's contextual editing still makes it real."**

Across all countries, the pattern is the same: GenAI is first turned to for the labor-intensive, repetitive aspects of planning, allowing teachers to allocate more mental bandwidth to the creative and relational dimensions of teaching.

5.2.2 From Lesson Plans to Classroom Integration

While lesson planning shows high adoption rates, the translation from planning to classroom practice reveals significant gaps. Teachers use GenAI extensively behind the scenes but rarely use it directly with students in instructional activities. Survey data show that classroom use lags substantially behind lesson planning use across all countries.

This gap between planning and practice is greatest in under-resourced countries. Zero percent of Philippine teachers reported using GenAI directly with students for authentic projects, compared to substantial rates in Qatar and Colombia, where infrastructure and institutional support enable student-facing applications. Comparatively, teachers in the Philippines and the United States reported the least use of GenAI to engage students in learning, though likely for different reasons: teachers in the Philippines often lack access to GenAI tools and devices for their students, and teachers in the United States are more skeptical of integrating GenAI into their teaching practice.

This gap reveals multiple considerations. First, infrastructure constraints limit what is possible. In the Philippines, students lack the devices and connectivity needed for GenAI-enabled activities. Second, policy absence makes teachers cautious about student use. Many teachers expressed concerns about plagiarism, data privacy, and appropriate use that made them hesitant to introduce GenAI directly to students. Third, pedagogical frameworks for student-facing GenAI use remain underdeveloped. Teachers lack clear models for how to structure activities that leverage GenAI effectively while maintaining academic integrity and learning rigor.

Other factors also play a role, including: the curriculum and its structure, along with teachers' ability to adapt it to AI; cultural considerations, such as perceptions that AI may threaten social and human values; and teachers' daily workload pressures, which limit the time available to explore AI's benefits within their subjects and classes.

5.2.3 Balancing GenAI Outputs with Pedagogical Expertise and Local Context

Balancing GenAI outputs with pedagogical expertise was a universal concern. Teachers repeatedly emphasized that GenAI suggestions must be filtered through their own subject knowledge and contextual awareness. A teacher in Colombia described checking GenAI outputs for accuracy and adapting it to local curricula: **"I always verify what AI produces against my curriculum standards (...) sometimes it gives me ideas I wouldn't have thought of, but sometimes it's completely off-base for what my students need."**

Teachers in Qatar described filling gaps where GenAI fell short. Teachers in India highlighted the need to tailor prompts to grade level, noting that generic GenAI outputs often assume knowledge or developmental readiness that doesn't match their specific students. Teachers in the United States noted that even well-crafted GenAI outputs required teacher refinement to align with district standards, pacing guides, and assessment frameworks.

Adapting GenAI-produced resources to local contexts proved particularly challenging. Teachers across all surveyed countries must routinely modify more Western-centric content produced by GenAI, revealing gaps in culturally responsive customization. GenAI systems trained primarily on English-language, Western education contexts produce outputs that often contain cultural assumptions, examples, or references that don't translate to other settings. Teachers described spending significant time "localizing" GenAI outputs, such as changing currency examples, replacing cultural references, and ensuring content respects local values and norms.

Despite many teachers reporting that they informally filter GenAI outputs, some lacked systematic strategies for seamless integration. Without explicit guidance on when and how to adapt GenAI outputs, the quality of instructional materials can vary widely, and opportunities for differentiation and creative adaptation are frequently missed.

5.2.4 Real-World Applications: Emerging Sophistication

While classroom integration remains limited overall, areas of sophisticated practice demonstrate GenAI's pedagogical potential. Real-world project work was most pronounced in Colombia and Qatar, countries with strong institutional support and reliable infrastructure, as documented in the previous theme (5.1).

Teachers in Colombia recounted student projects where GenAI tools helped students research existing solutions, generate design ideas, and troubleshoot technical challenges. For example, one student project developed a smart-cane prototype for the visually impaired. These projects positioned GenAI as a research assistant and brainstorming partner that enhanced rather than replaced student creativity and problem-solving.

Teachers in Qatar described using GenAI to design different writing prompts that provided varying levels of scaffolding for students at different proficiency levels. Some used GenAI to generate multiple versions of the same assignment at different complexity levels, allowing teachers to personalize challenges for different students while maintaining common learning objectives. Others used GenAI to create authentic scenarios and case studies, converting abstract concepts into more concrete lessons.

The richness of these applications appears directly linked to the strong institutional support documented in the previous theme (5.1), systemic backing enables teachers to use GenAI in a way that moves beyond lesson plan generation and into authentic, project-based learning.

5.2.5 Key Takeaways

The concentration of GenAI use in lesson planning, while valuable, has limitations. The full pedagogical potential of GenAI, including formative assessment, adaptive tutoring, and personalized, student-centered learning experiences, remains largely underutilized. Realizing this potential requires developing teachers' technical skills as well as pedagogical frameworks, institutional permission structures, and infrastructure that provides student access to GenAI tools.

5.3 Ethical Concerns and the Paradox of Expertise

The dominance of GenAI in planning raises a critical question on why enthusiastic teachers hesitate to expand their use. This emerging theme reveals that ethical concerns, particularly among the most skilled users, create significant barriers to deeper integration.

Across interviews and survey responses, teachers consistently voiced ethical and pedagogical concerns surrounding GenAI use. While most educators recognized its instructional value, they also highlighted a spectrum of moral, technical, and developmental concerns that influence how confidently they integrate GenAI in classrooms. Paradoxically, the teachers most experienced with GenAI often expressed the strongest ethical concerns.

5.3.1 Plagiarism: Universal Concern, Uneven Responses

Plagiarism was flagged as an ethical concern across all countries. Teachers in Qatar, Colombia, India, and the Philippines all reported that students frequently copy and paste GenAI outputs without critical engagement. In the United States, 29% of teachers raised this concern, reflecting a somewhat lower but still notable level of worry. In interviews, teachers in Colombia, the Philippines, and Qatar expressed the most concern about students copying and pasting GenAI outputs. As one Colombian teacher explained, **"My biggest worry is that students will just take what ChatGPT gives them and submit it as their own work without even reading it. They're not learning anything that way."** This concern reflects deeper anxieties about GenAI short-circuiting the learning process: students obtaining answers without engaging in the cognitive work that builds understanding.

Regression results reinforce these findings: teachers in Qatar expressed significantly stronger agreement that GenAI contributes to plagiarism compared with teachers in the United States. Close to half of teachers in Colombia (40%) also emphasized students' overreliance on GenAI, warning that excessive dependence may erode students' ability to reason through problems or evaluate information independently.

While concerns about plagiarism are nearly universal, concrete classroom practices for detecting or deterring plagiarism remain scarce. Teachers described feeling ill-equipped to address GenAI-assisted plagiarism, noting that traditional plagiarism detection tools don't work for GenAI outputs. Some reported developing informal strategies, asking students to explain their work orally, requiring process documentation, or designing assignments that require synthesis beyond what GenAI can easily provide. These remain as individual teacher innovations rather than systematic institutional responses.

This gap indicates uncertainty rather than complete rejection. The lack of clear institutional policies heightens teachers' worries, revealing that policy guidance can ease uncertainty and aid responsible adoption, especially in early-stage policy environments.

5.3.2 The Creativity Paradox: Expert Users' Greatest Concern

Creativity concerns emerged from regression analysis as another paradoxical finding: teachers who were most confident and frequent GenAI users also tended to be most apprehensive that GenAI might diminish student creativity. This pattern suggests that familiarity with GenAI reveals its limitations and risks, more clearly than inexperience does.

A teacher in Colombia who taught technology and math in tenth and eleventh grades articulated this concern:

> **"If students don't develop computational and logical thinking—step-by-step reasoning—then they won't know how to judge whether an answer is valid. They won't reason things through. That's a big risk: losing the ability to explain why something is right or wrong."**

This comment reveals teachers' concerns about how GenAI might interfere with cognitive development, not just immediate learning outcomes.

In interviews, teachers depict GenAI as a "double-edged sword": it can inspire new ideas but also encourage over-reliance on GenAI outputs. Many teachers described a tension between efficiency and originality: GenAI saves time but may "flatten" students' creative engagement. Teachers in the United States expressed the greatest worry about creativity loss, whereas teachers in India were least likely to share this fear. Teachers with lower formal education levels tended to be less sensitive to this issue, suggesting that awareness of creativity trade-offs grows with pedagogical expertise and experience using GenAI tools.

The height of these concerns among teachers suggests they are engaging critically with GenAI's pedagogical implications rather than rejecting it entirely. They recognize both its potential to support learning and its risks of replacing the cognitive struggle that builds deep understanding and creative capacity.

5.3.3 Prompt Engineering Awareness and Responsible Use

Foundational GenAI literacy skills, including awareness and knowledge of prompt engineering, varied widely across countries. All teachers in Colombia (100%) and the Philippines (100%) recognized the importance of crafting precise GenAI prompts, emphasizing that **"the quality of output depends on the quality of the question."** This high awareness in the Philippines is particularly notable given the infrastructure challenges documented in the previous theme (5.2). Teachers have developed deep conceptual understanding although practical application is limited.

Awareness of prompt engineering was considerably lower in India (40%), the United States (57%), and Qatar (60%). Nevertheless, even in countries with lower awareness, teachers expressed a clear understanding of why thoughtful prompting matters, often noting that **"poorly phrased prompts yield poor results."**

5.3.4 Data Privacy and Information Security

Ethical concerns extended to **data privacy**, though awareness levels varied significantly across countries. In Colombia and Qatar, about 20% of teachers mentioned privacy risks, compared with 40% of teachers in India. Teachers in the Philippines and the United States expressed the least concern for data privacy overall, and many lack a clear grasp of how GenAI tools handle personal data. Teachers rarely discuss where student data goes when uploaded to GenAI systems, how long it's retained, or who has access to it.

This lack of awareness is particularly concerning given that GenAI tools often require substantial data input, including student work, assessment results, and personal information, and many commercial GenAI systems use this data to train their models. Teachers' limited awareness of privacy implications suggests a need for explicit training on data protection principles and practical guidance on selecting and using GenAI tools that respect student privacy.

5.3.5 Other Ethical Concerns

Other ethical concerns emerged though less frequently across interviews. Approximately 20% of teachers in the United States, Qatar, and Colombia mentioned **misinformation** concerns—worries that GenAI outputs might contain factual errors that students accept uncritically. Teachers noted that GenAI systems can "hallucinate" information, presenting false facts with the same confidence as accurate information.

Concerns about teaching GenAI to students who are too young were raised by teachers across all countries who taught younger students (under fifth grade). These teachers questioned whether young children have the developmental maturity to engage critically with GenAI tools, expressing worries that early exposure might create unhealthy dependencies or interfere with foundational skill development.

More sparsely arising concerns included intellectual property questions (who owns GenAI outputs?), fears about falling behind other countries in GenAI integration, worries about trusting GenAI outputs too much without verification, and feeling pressure from stakeholders (school administration, parents) to teach students GenAI. This last concern reveals tensions between enthusiasm for innovation and recognition of ethical challenges.

5.3.6 Key Takeaways

These findings reveal that while teachers across all five countries increasingly engage with ethical questions about GenAI, their preparedness to teach or operationalize those principles remains limited. Ethical literacy tends to evolve from informal reflection rather than through structured training.

To bridge the gap between awareness and systematic practice, professional development programs need to include modules on academic integrity, data privacy, and prompt-engineering ethics.

5.4 GenAI Literacy Development and Professional Learning Needs

The ethical concerns documented in the previous theme (5.3) reveal gaps between awareness and actionable knowledge**.** The final theme examines what teachers know and don't know about GenAI and what professional learning structures exist or are needed to close essential knowledge gaps.

Summary of Core Literacy Gaps

Despite growing enthusiasm for GenAI in education, six interrelated literacy gaps limit effective integration:

1. **Conceptual understanding** remains uneven, with many teachers lacking clear grasp of GenAI capabilities, limitations, and appropriate applications beyond basic content generation.
2. **Pedagogical integration skills** are underdeveloped, with few systematic frameworks for blending GenAI outputs with established teaching practices or adapting content to local contexts.
3. **Ethical and integrity literacy** shows gaps in plagiarism detection, data privacy awareness, and responsible use frameworks that can be taught to students.
4. **Language and communication barriers** significantly constrain non-English-dominant teachers' ability to use predominantly English-trained GenAI systems effectively.
5. **Professional development access** varies dramatically by context, creating wide disparities in teacher preparedness even within countries.
6. **Infrastructure constraints** limit hands-on learning opportunities, particularly in countries with unreliable connectivity or limited device access.

5.4.1 Language Barriers

Lower English proficiency correlates with weaker positive attitudes toward GenAI, limiting teachers' ability to craft effective prompts and interpret GenAI outputs. This limitation reflects current technological constraints: most GenAI tools are trained primarily on English-language data and perform less reliably in other languages. This pattern appeared consistently in Qatar, Colombia, and the Philippines, where teachers working in languages other than English faced additional cognitive load.

Some teachers reported creative workarounds, such as using GenAI to help translate materials, creating shared prompt libraries in local languages with colleagues, or developing "hybrid" prompts that mix English with local languages. However, these remain individual teacher solutions rather than systematic or institutional support.

Some teachers noted that newer GenAI systems handle their languages better than earlier versions did, suggesting that technological evolution is gradually addressing this limitation. However, current policy must accelerate this process through investments in multilingual GenAI development and localized training resources.

5.4.2 Professional Development and Institutional Support Gaps

Professional development and institutional support are uneven across and within countries. Teachers who entered the profession through nontraditional routes or without formal preparation programs exhibit markedly lower GenAI readiness. Even among formally prepared teachers, ongoing professional development on GenAI remains inconsistent.

Teachers who completed a university-based teacher-preparation program were far more likely to feel GenAI-ready (United States 70.8%, Colombia 76.4%, Qatar 53.0%). Those whose preparation was on-the-job, alternative, or absent altogether displayed lower GenAI readiness scores and were less inclined to hold positive beliefs about GenAI.

School-level support varies widely: strong backing appears in Qatar and India, where systematic professional development includes GenAI training, whereas the Philippines and parts of the United States report minimal or no support. Additionally, where there is no unified national or district-wide GenAI literacy framework, teachers rely on self-directed learning or ad hoc workshops.

The most effective professional development, as reported by teachers experiencing it, shares several characteristics:

- Is ongoing rather than one-time, providing multiple touchpoints for skill development and troubleshooting.
- Is job-embedded rather than generic, addressing specific challenges teachers face in their disciplines and grade levels.
- Includes opportunities for peer collaboration and experimentation, allowing teachers to learn from each other's successes and failures.
- Creates institutional permission to experiment, reducing anxiety about making mistakes or trying approaches that might not work initially.

However, significant gaps remain even in well-supported countries. For all countries, 40% or less of teachers reported being aware of curriculum updates related to GenAI, suggesting that professional development often operates separately from curriculum and standards frameworks. This disconnect means teachers may be learning GenAI skills without clear guidance on how they align with required learning objectives or assessment frameworks.

5.4.3 Key Takeaways

Despite growing enthusiasm for GenAI in education, significant GenAI literacy gaps persist across multiple interrelated domains. Teachers cannot develop full GenAI literacy in the absence of infrastructure, without institutional support, or without structured professional learning opportunities. The literacy gaps documented here are not individual deficiencies, but system-level challenges requiring system-level solutions.

6. Policy Recommendations

GenAI is reshaping learning globally, and teachers' responses to this shifting landscape are shaped by what is possible both nationally and locally. Through this multi-country analysis, we observed that enabling environments, such as institutional support, infrastructure access, and professional development, play a critical role in fostering teacher enthusiasm and translating it into meaningful classroom practice.

Recognizing that these environments vary significantly due to the diverse education systems represented in this study, the recommendations outlined build on the strengths and challenges identified across these contexts. They are designed to be context-specific, drawing from what works in each context to inform scalable and equitable strategies.

Findings consistently show that more guidance, not less, is essential for helping teachers use GenAI productively and ethically. Policy responses must therefore blend pedagogical foresight, equitable resource allocation, and robust ethical safeguards to ensure that GenAI use is both responsible and impactful.

6.1 Build National GenAI Literacy Frameworks

- Develop competency standards that define what GenAI-ready teachers should know and be able to do, aligned with curriculum goals and pedagogical principles rather than just technical skills.
- Develop and implement a national GenAI and digital literacy framework for teachers as part of pre-service teacher training. Integrate core modules on prompt engineering, ethical GenAI use, and creative co-design into all teacher-preparation programs. Ensure these modules are freely accessible to all teachers through open digital platforms, enabling continuous professional learning and equitable access across regions, school types, and language.
- For teacher groups that may be lagging behind, offer "bridging workshops" and invite teachers from non-traditional pathways to participate.
- Address language barriers systematically through translated training materials and support for teachers working in non-English-dominant contexts.

6.2 Establish Institutional Support Structures

- Coordinate with schools' IT departments to ensure sustained technical and pedagogical support for GenAI integration. Designate GenAI Leads (teachers or specialists) within each school to curate resources, provide peer mentoring, and champion responsible GenAI use throughout the school.
- Allocate dedicated budget lines for GenAI tool subscriptions and related digital resources with priority support for low-resource schools to promote equity and consistent implementation.
- Develop institutional support mechanisms at the school level that facilitate continuous mentorship and structure capacity-building programs so that teachers can engage with GenAI integration collaboratively rather than independently.
- Build continuous professional development pathways that move beyond one-time workshops to sustained, in-service learning opportunities.

6.3 Prioritize Equitable Investments in Infrastructure

- Prioritize infrastructure investment in contexts with chronic access gaps, particularly reliable broadband and device availability. Infrastructure is not a secondary consideration but a prerequisite for all other GenAI integration efforts.
- Conduct infrastructure audits to identify specific gaps, including availability of devices, reliability of connectivity, bandwidth capacity, and technical support systems.
- Establish minimum infrastructure standards that define what reliable GenAI-ready technology access means in practical terms (devices per student, bandwidth requirements, technical support availability).

6.4 Institute Academic-Integrity Guidelines

- Develop clear, enforceable policies on using GenAI outputs, paired with plagiarism-detection tools tuned for generative text.
- Provide teachers with concrete strategies for detecting and addressing GenAI-assisted plagiarism, including assignment redesign approaches that make simple copying less viable.
- Balance integrity concerns with pedagogical innovation—policies should guide responsible use rather than ban GenAI tools outright, recognizing that outright bans are unenforceable and counterproductive.

6.5 Provide a Creative-Partner Pedagogy Toolkit

- Produce open-access lesson plan templates that require students to extend GenAI outputs (e.g., critique, remix, apply to novel contexts).
- Showcase exemplar projects where GenAI catalyzes, rather than replaces, student creativity, documenting implementation details so other teachers can adapt approaches.

6.6 Conduct Continuous Monitoring and Enable Feedback Loops

- Implement a lightweight annual teacher survey (similar to this study) to track GenAI readiness, usage, and concerns across representative samples.
- Pair quantitative analysis with periodic qualitative focus groups to surface emergent issues quickly.
- Establish cross-national learning networks where education systems share findings, challenges, and solutions.

6.7 Context-Specific Recommendations

In addition to these generalizable recommendations, the following recommendations are tailored to specific contexts based on the patterns identified in this study:

- **Institutionalized adopters (Qatar, Colombia)** need to sustain current momentum by deepening equity focus—ensuring GenAI benefits reach all student populations. Expand from lesson planning dominance toward more student-centered classroom applications. Continuously refine ethical guidelines based on emerging challenges. Document and share effective practices to benefit other countries.

- **Literacy-focused innovators (Philippines)** need to prioritize infrastructure investment urgently—teacher capacity is outpacing system capacity. Maintain strong emphasis on ethical awareness and prompt engineering while building infrastructure. Develop interim strategies for offline or low-connectivity GenAI use where possible. Leverage high teacher literacy to create peer support networks that can sustain infrastructure building.
- **Cautious experimenters (United States, India)** need to build institutional coherence through coordinated professional development and clear policy frameworks. Address fragmentation by developing national or regional guidance even if implementation remains local. Invest strategically in both teacher capacity-building and ethical literacy development. Create demonstration projects showcasing effective, equitable GenAI integration to build confidence.

7. Conclusion and Future Directions

This study paints a global picture of how K–12 teachers are meeting the rise of GenAI. Enthusiasm is universal, but true readiness depends on local realities, where individual skills, institutional support, and national infrastructure all shape how innovation takes root.

Teachers in Colombia and Qatar show strong integration and alignment with equity goals, while the Philippines demonstrates high literacy and ethical concern but faces structural barriers. India's teachers embrace GenAI as a supportive tool but struggle with limited awareness of advanced practices such as prompt engineering. Meanwhile, U.S. teachers report lower enthusiasm, weaker systemic support, and a sharper divide between pressure to adopt and skepticism about GenAI's instructional value. Across countries, three overarching themes emerge. First, **capacity and training** remain decisive: teachers with formal preparation and institutional support consistently report greater confidence, more positive beliefs, and more effective classroom use. Second, **institutional and policy frameworks** are critical: without systemic backing, teacher enthusiasm risks translating into fragmented or inequitable practices. Finally, **ethics and equity** must be woven into GenAI adoption, as concerns about plagiarism, creativity, and access remain central to teachers' lived experiences.

For policymakers and education leaders, these findings underscore that GenAI adoption is not a purely technical challenge but a pedagogical and systemic one. Effective strategies must invest simultaneously in teacher training, institutional scaffolding, and equity-driven safeguards. Building teacher GenAI literacy into preparation pathways, aligning professional development with national GenAI strategies, and ensuring equitable access to tools and infrastructure are urgent priorities.

Future research should extend these insights by examining how students themselves engage with GenAI under different systemic conditions and how localized adaptations of GenAI tools may help reduce inequity and promote inclusive use. Longitudinal studies are also needed to track how teacher attitudes, classroom practices, and student outcomes evolve as GenAI becomes embedded into curricula and policy frameworks.

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Appendices

Appendix A: Survey Protocol

Study Procedures: Participants will read and electronically sign an online informed consent form. Complete one survey including four sections: Demographics & Teaching Background, Educational Technology Experience, Generative AI Awareness, Confidence, and Use and Perceptions of AI Use, Usefulness, and Impact. Responses will be de-identified before analysis. No personally identifiable information will be published.

Participants' Eligibility Criteria

1. Currently employed as a K–12 teacher or equivalent instructional role.
2. Aged 18 years or older.
3. Fluent in English or local survey translation language.

Survey Structure

Section 1: Demographics

1. How confident are you in your English-speaking abilities? 1) Not at all confident; 2) Slightly confident; 3) Somewhat confident; 4) Fairly confident; 5) Completely confident.
2. How confident are you in your English-writing abilities? 1) Not at all confident; 2) Slightly confident; 3) Somewhat confident; 4) Fairly confident; 5) Completely confident.

Section 2: Teaching Experience

3. Have you ever used and received training on education technology tools (not AI) in your teaching? 1) Not used at all; 2) Not used but received training; 3) Used but did not receive training; 4) Used and received training.
4. If yes, how often do you use educational technologies in your classroom? 1) Once a week; 2) 2–3 times a week; 3) 4–6 times a week; 4) Daily.
5. How comfortable are you with using educational technologies in your classroom? 1) Extremely uncomfortable; 2) Somewhat uncomfortable; 3) Neither comfortable nor uncomfortable; 4) Somewhat comfortable; 5) Extremely comfortable.

Section 3: Generative AI

6. How familiar are you with the concept of generative AI? 1) Not familiar at all; 2) Slightly familiar; 3) Moderately familiar; 4) Very familiar; 5) Extremely familiar.
7. How confident are you in using an English-based AI tool? 1) Not at all confident; 2) Slightly confident; 3) Somewhat confident; 4) Fairly confident; 5) Completely confident.
8. During the 2022–23 and 2023–24 school years, how often do you use generative AI tools for preparation tasks, such as writing lesson plans, creating assignments, grading, etc.? 1) Never; 2) Rarely; 3) A few times a month; 4) Once a week; 5) A few times a week; 6) Every day.
9. During the 2022–23 and 2023–24 academic years, how often did you use generative AI tools for teaching tasks during class, such as visual presentations, classroom management, feedback, etc.? 1) Never; 2) Rarely; 3) A few times a month; 4) Once a week; 5) A few times a week; 6) Every day.

10. How useful do you think generative AI tools are for your teaching practice? 1) Not useful at all; 2) Slightly useful; 3) Moderately useful; 4) Very useful; 5) Essential.
11. In your school, how encouraged or discouraged are you to use generative AI tools? 1) Strongly discouraged; 2) Somewhat discouraged; 3) Neutral; 4) Somewhat encouraged; 5) Strongly encouraged.
12. How relevant do you think generative AI tools are to your teaching practice? 1) Not relevant at all; 2) Slightly relevant; 3) Moderately relevant; 4) Very relevant; 5) Extremely relevant.

Section 4: Impact Evaluation

13. Generative AI tools have enhanced my efficiency as a teacher by streamlining tasks. 1) Strongly disagree; 2) Somewhat disagree; 3) Neutral; 4) Somewhat agree; 5) Strongly agree.
14. Generative AI tools have been beneficial for students' learning outcomes and experiences. 1) Strongly disagree; 2) Somewhat disagree; 3) Neutral; 4) Somewhat agree; 5) Strongly agree.
15. Generative AI tools have contributed to more personalized learning opportunities for all students. 1) Strongly disagree; 2) Somewhat disagree; 3) Neutral; 4) Somewhat agree; 5) Strongly agree.
16. Professional development for generative AI tools must be mandatory and available for all teachers. 1) Strongly disagree; 2) Somewhat disagree; 3) Neutral; 4) Somewhat agree; 5) Strongly agree.
17. Generative AI tools have led to an increase in plagiarism. 1) Strongly disagree; 2) Somewhat disagree; 3) Neutral; 4) Somewhat agree; 5) Strongly agree.
18. Generative AI tools have led to a decrease in creativity/originality among students. 1) Strongly disagree; 2) Somewhat disagree; 3) Neutral; 4) Somewhat agree; 5) Strongly agree.

Section 5: Professional Development

19. What mode of professional development do you prefer for learning about generative AI tools? (Select one) 1) In-person workshops; 2) Online courses; 3) Peer learning sessions; 4) Self-paced tutorials; 5) Hybrid.
20. Have your students' outcomes improved since using generative AI tools? 1) Yes; 2) No; 3) Not sure.

Appendix B: Interview Protocol

Duration: 20-30 minutes
Format: Formal Semi structured interview (Olson, 2016)

Background: Generative AI (GenAI) tools like ChatGPT, Claude, and Copilot are increasingly integrated into education worldwide. While adoption is growing, further understanding is needed regarding how teachers in diverse cultural contexts perceive and develop AI literacy. We conducted an international survey of teachers from various countries, including the United States, India, Qatar, Colombia, and the Philippines, focusing on their use of GenAI for class preparation and teaching. Building on these findings, we are interviewing selected participants to qualitatively explore how teachers interpret and develop AI literacy in their practice. The purpose of these interviews is to ask questions that directly extend the survey's key themes so that quantitative results can be explored in depth qualitatively.

Interview Structure

Part 1. Background (2 mins)

1. Can you tell me a bit more about your teaching context? (survey items: country, institution_type, grade_level, subjects, experience)
    Optional: What country and type of school are you teaching in?
    Optional: What grade levels and subjects do you teach?

2. How would you describe your comfort level with using educational technology in general (not just AI)? (survey items: ed_tech_training; ed_tech_comfort, training)
    Follow-up: What kind of training and support have you received on digital tools (educational technology)? Asking for specific training or support.

Part 2. Understanding of AI Literacy (4-6 mins)

3. What does "AI literacy" mean to you as a teacher?
    Follow-up: Do you feel it's something all teachers need to develop? Why or why not?
4. Can you share an experience where you felt you were learning something new about how AI works, which should be used in education?

Part 3.1 Use generative AI tools during instructional preparation vs. classroom teaching (5-8 mins)

5. You mentioned using GenAI in lesson prep (e.g., writing plans or materials). What does that process look like for you? (survey item: freq_use_instruct)
    a. How confident do you feel in navigating AI suggestions vs. your own expertise in lesson prep?
6. What about during class time? If you use AI in the classroom, how do you guide students in interacting with it? (survey item: freq_use_teach)

Part 3.2 Teachers' perceptions (3-5 mins)

7. Has your GenAI use changed how you think about your own educational technology skills? In what way?
    a. Based on your experiences, what do you think are the main benefits of using generative AI?
    b. Have you noticed any challenges and risks to using these tools?

Part 4. Institutional Context / Country differences (3-4 mins)

8. How does your school or institution currently support the use of AI tools in classrooms? (survey items: perception_of_use, pd_mode)
    a. Are there any country-specific policies that guide how you can or cannot use AI in your teaching?

Part 5. Reflections and Aspirations (3-5 mins)

9. Do all your students have access to the technologies required to use AI tools (e.g., devices, internet, apps)?
10. What do you believe is the role of teachers in training students to develop AI literacy?
11. If you could design your own ideal training or support system for AI in education, what would it include?

About WISE

WISE is a global education platform and think-and-do tank convening leaders to shape the future of learning. Established in 2009 by Qatar Foundation under the leadership of its Chairperson, Her Highness Sheikha Moza bint Nasser. WISE drives educational innovation through policy engagement, research, leadership development, and practitioner programs. Through our year-round activities and flagship bi-annual Summit, WISE is building the future of education through strategic local, regional, and international collaborations.

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AI Disclaimer

The authors acknowledge the use of AI tool in the writing process of this study, primarily to enhance the readability of the findings. AI-generated content was not used verbatim; instead, it was thoroughly reviewed, edited, and curated by the authors to ensure accuracy, authenticity, and integrity. Human oversight and judgment were essential in interpreting and validating the AI's contributions.

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ThinkBay
Qatar Foundation – Education City
P.O. Box 5825 Doha, Qatar