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BLENDING LEARNING WITH AI IN INDIAN HIGHER EDUCATIONAL SPHERE: A CRITICAL REVIEW AT WHAT WORKS WHAT DOESN'T AND WHERE THINGS ARE GOING

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Abstract

At the outset, more institutions around the world have started using artificial intelligence in classrooms - India's colleges are moving fast in this shift. Looking closely at how well AI works in mix-mode classes there, this piece pulls together results from key research plus related writings. Findings come from surveys, combined-method reports, and studies without fixed designs done inside Indian universities. A pattern shows up - most students now use some form of AI tools, like one report noting 73 percent involvement; benefits include sharper feedback, better exams, tailored lessons, easier reach during online sessions. Still, gaps remain when it comes to fair tech access, teaching roles fading, privacy risks. Zooming out, comparisons with worldwide models suggest something clear - in India's academic spaces, AI adds onto classroom teaching instead of taking its place. Still, key holes remain in long-term studies, so coming work needs stronger trial setups. All signs point to AI-backed mixed teaching shaking up India's colleges - if fairness issues and moral checks aren't ignored along the way.

Keywords: AI In Education, Blended Learning, Indian Higher Education, Adaptive Learning, Edtech, Personalized Learning, Digital Equity

Introduction

Higher education in India faces a turning point. Rooted deeply in history, teaching once flowed from guru to student in quiet settings, later taking shape under British rule and expanding after independence. Now, something different emerges - fast-moving tech advances powered by smart algorithms, pattern recognition, and vast flows of information. These forces shift how lessons form, reach learners, and get measured across nations. Where old methods meet modern tools, a new way forms slowly - mixing live classrooms with adaptive software that responds to individual progress, adjusting pace and path without fanfare or fixed labels (Garrison & Kanuka, 2004; Dziuban et al., 2018).

With India hosting one of the planet's biggest university networks - home to 43 million learners and spanning thousands of campuses by the early 2020s - the sheer size impresses. Still, problems linger beneath the surface; teaching staff are stretched thin due to overwhelming student numbers. Quality varies sharply from college to college, often splitting along city versus countryside lines when it comes to materials and support. Coursework tends to trail behind what careers actually require these days, lagging in relevance. Because of such gaps, schools now eye artificial intelligence solutions - not blindly hopeful, yet aware that help might come with trade-offs.

Out of nowhere came the pandemic - classrooms vanished when lockdowns hit. Overnight, screens replaced seats for countless learners, shining a light on gaps long ignored. Some struggled more than others once Wi-Fi became essential. Years passed before doors reopened, yet things never went back to how they were. Instead, pieces from both worlds stuck - a mix of face-to-face and virtual spaces. Tools powered by artificial intelligence stayed behind after proving useful. Machines answered routine questions at any hour. Learning paths bent to fit each person's pace thanks to smart software. Teachers gained sharper views into who was keeping up - or falling behind.

Looking closely at what research shows about this topic forms the core of this piece. From a careful look through three main pieces of work - Ali et al. (2024), Sandu and Gide (2019), and Yadav (2020) - a picture begins to form. Each one explores how AI tools get used in colleges across India, yet each takes its own path in doing so. Beyond those, other published studies help stretch the view further, linking local results to wider ideas around the world. Three big questions guide where this



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goes next. First up: just how much does using AI actually boost how well students learn when classes mix online and face-to-face settings? Then comes a closer peek at who uses these tools, how often they show up in daily study life, along with what learners say about their time with them. Last part digs into hurdles that pop up - the tricky parts involving fairness, access, long-term fit, plus concerns tied to privacy and responsible use.

2. Theoretical and Conceptual Foundations

Later on, thinking about AI in mixed classrooms means linking it to known ideas in teaching. Not long ago, educators began combining regular class time with digital tasks - a setup built on the idea that people build understanding by doing and thinking (Vygotsky, 1978; Jonassen, 1999). From another angle, artificial intelligence acts like an invisible helper during these lessons. Instead of staying fixed, such tools shift as students grow, matching their current ability level. Through this lens, support comes only when needed, neither too much nor too little, helping each person advance at their own pace (Roll & Wylie, 2016).

A look at how people learn together online often turns to the CoI model made by Garrison, Anderson, and Archer back in 2000. What holds up good learning, it says, is thinking deeply, connecting with others, and having clear guidance from teachers. When smart software helps learners explore ideas step by step, that builds mental engagement. Talk-like bots, answering questions in real time, act like another person nearby. Data on student activity gives educators clues - showing exactly where help might be needed most. This mix of tech touches each part of what makes digital classrooms work well.

Right now, inside India's college classrooms, the TPACK idea from Mishra and Koehler (2006) fits well. Instead of treating tech skills separately, it weaves together knowing the subject, understanding how to teach, along with comfort using digital tools. While looking at what teachers actually do, signs show most still treat artificial intelligence like an add-on - more decoration than foundation. Because of this gap, full blending into daily lessons hasn't taken root yet, matching earlier notes by Yadav (2020).

3. AI Tools Use and Student Learning Results Examined

3.1 How AI Spreads Across Indian Universities

Out of all the studies looked at, Ali and colleagues' 2024 research stands out - using both numbers and personal accounts from 100 students, mostly from universities but also some from smaller colleges scattered around India, where nearly three-quarters came from villages. Most of those asked said they'd used learning apps built on artificial intelligence - about seven in ten - which might surprise anyone who thinks tech access is rare in rural parts of the country; yet these results come from volunteers, so their views may not reflect everyone equally.

Looking closer, grad students used AI tools more often compared to undergrads - a trend seen worldwide among those at higher study levels who usually work more independently and feel comfortable with tech (Mayer, 2009). When some lean on AI heavily while others don't, fairness becomes an issue inside schools; gains meant for all might instead flow mostly to those already ahead.

From another direction came Sandu and Gide in 2019, turning attention toward chatbots within well-known Indian universities. Though exact numbers stayed hidden because the survey group wasn't revealed, patterns showed usage climbed where staff saw gains - not just in how fast work got done, but also in clearer exchanges and smoother classroom support. Behind this lies a familiar thread: people lean into tech when it clearly helps them do things better, right now. That idea echoes an older insight by Davis back in 1989 - the one about usefulness shaping whether someone accepts new tools.

A look into Yadav's 2020 research at Delhi University reveals something subtle yet telling - learners mostly treated AI tools as helpers alongside core methods, not replacements. Because of this tendency, the role of artificial intelligence stays secondary in practice. Since these tools slot into existing routines instead of overriding them, they echo what blending



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learning environments aim for. Such patterns show up clearly when comparing student habits with earlier models like those from Bonk and Graham in 2006.

3.2 How learning results and student experience are affected

In a recent study by Ali and colleagues from 2024, detailed insights emerge about how students learn when AI is involved. Roughly half of those surveyed felt that using AI helped tailor lessons better to individual needs - scores ranged between 47% and 59%. This spread comes from differences among types of software; broad teaching platforms tended to score higher here compared to narrow backend tools. On grading and responses to student work, improvements were noticed by 35% to 40% of participants. Access to distance education also saw positive shifts, with nearly half noting easier entry points through tech support. Such patterns line up well with earlier worldwide reviews showing similar trends. One key finding from VanLehn's analysis back in 2011 revealed that smart tutoring setups often lift achievement noticeably beyond traditional methods - by around one full standard deviation.

Notice how Ali et al. (2024) highlight better testing approaches - about 40 percent saw improvements. In India, university exams have long focused on final tests where remembering facts beats using ideas. Yet now, smart tools like responsive quizzes, instant essay grading, or live understanding scans are shifting the pattern. Instead of just one big exam, these methods adjust as students go. Findings from Luckin et al. (2016) show such ongoing digital feedback helps learners keep hold of knowledge longer because they get clear guidance when it matters most.

A third of learners felt more involved when AI entered the classroom, showing how technology can turn quiet sessions into active ones. Not every lesson stays flat once smart systems join in. Large groups in Indian universities usually mean less personal attention - AI changes that by responding individually even with hundreds present. One shift happens quietly: exercises begin adapting to each person instead of following a rigid plan. When game-like features blend with artificial intelligence, undergrads spend longer working without being told - they simply stay engaged. This matters especially now, since national goals push hard on science and tech training across campuses nationwide. Learning sticks better when it feels like playing rather than performing.

Back in 2020, Yadav pointed out how students value ease, adaptability, and saved minutes - small wins, maybe, when stacked beside deep academic progress, yet deeply meaningful where it counts. Because life happens differently here: undergrads across India, especially those on campuses tucked into villages, often juggle classes with chores at home, side jobs, or bus rides that eat up hours each day. When artificial intelligence shapes lessons around real-life demands like these, it stops being just about comfort - it becomes something sturdier, a quiet tool for fairness, as Kapasia's team noticed the same year.

4. Implementation Challenges and Structural Barriers

4.1 Digital Equity and the Rural Urban Divide

Startling gaps hide behind upbeat findings. Look closer, one thing becomes clear - uneven tech access undercuts progress. Trouble isn't rare. Six percent spoke up about it, said Ali and team in 2024. Small number? Maybe. Wait. Remember, three out of four came from rural spots. Yet even there, only those with working gear joined in. Think about who got left out. That gap stretches wider than numbers show. Rural colleges face deeper hurdles than surveys capture.

Even though Jio has pushed cheaper internet across India lately, city homes still get online far more easily than village ones - a gap clear in every National Sample Survey (IAMAI, 2023). Reaching real fairness in learning through AI tools? That hinges on fixing basic things first: steady power, working broadband, accessible gadgets - not someday dreams but must-haves right now (Sharma, 2019; UNESCO, 2021).



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4.2 Pedagogical Questions Around Human Engagement and Teaching Functions

One worry stands out - less face-to-face contact, mentioned by over a third of those surveyed. Another concern follows close behind: machines taking teachers' roles. What underlies both fears isn't just resistance to change. In Indian classrooms, teaching ties into identity, values, meaning. This bond echoes an old model - the guide and learner linked through trust. When tech steps between them, it feels less like progress, more like loss.

Student choices often lean toward familiar classroom exchanges, Yadav observed in 2020, along with conventional instructor expectations. Yet this tendency does not block AI adoption; instead, it highlights how artificial intelligence might handle routine mental chores, leaving space for educators to deepen personal guidance. According to Holmes and colleagues in 2019, technology ought to strengthen what teachers already do well - not mimic or remove their human presence.

4.3 Ethical Issues in Data Security Bias and Academic Integrity

Some worries pop up in Ali et al. (2024), touching on how data stays safe - reported by one in five - and unfair patterns in AI choices, flagged by 11%. Though those numbers appear small now, they hint at debates that will grow louder as schools lean further into artificial intelligence. Security of information stands out sharply because India has just reshaped its rules around privacy through recent laws. The Digital Personal Data Protection Act (2023) sets fresh duties when gathering or using personal details - even ones made during learning activities powered by smart systems (MEITY, 2023).

Hidden within code, algorithmic bias can quietly tilt outcomes. When artificial intelligence learns mostly from schools where English dominates, it might overlook learners shaped by different tongues or traditions. Across India's vast academic landscape - where classrooms echo in twenty-plus official languages and countless local ways of speaking - ready-made software from distant labs could stumble. These tools, built without seeing such variety, sometimes favor patterns they know too well. Mistakes creep in when machines assume one way fits all. Developers often do not realize what their models miss until real students face the gap. The mismatch grows sharper where culture shapes how knowledge shows up.

5. New Patterns and What Might Come Next

Out of the gathered research, three broad patterns take shape - each one pointing toward different consequences for how India handles its college and university systems. Though drawn from wide sources, these shifts stand apart in what they suggest about teaching, access, and governance down the road. One follows economic pressure, another tracks demographic change, while the third ties closely to technology's uneven spread across regions.

One change already taking shape? Deeper links between artificial intelligence and mixed teaching setups. Schools slowly getting used to AI tools - tools now better shaped for classrooms across India - are beginning to move past just adding tech on top. Instead they're weaving it right into how lessons happen, blending machine help with teacher guidance so each shapes the other. The country's education plan from 2020 didn't just mention this shift - it pushed hard for smart systems that tailor learning to individual students. Part of that vision means creating a national forum focused entirely on education technology, showing leaders here back the idea more than before.

Another change taking shape involves how schools handle AI in an ethical way. Worries about privacy and unfair outcomes, like those found by Ali and team in 2024, aren't rare exceptions - instead, they mirror growing awareness worldwide regarding blind spots in adopting AI too fast. Because of this, top universities across India started forming their own rules on AI ethics. Meanwhile, groups including the University Grants Commission urged clear standards for using AI responsibly within colleges, as noted in UGC's 2023 statement. Ideas from scholars suggest models for dependable AI in learning, where openness, responsibility, balance, and giving students control serve as key pillars, according to Floridi's work nearly six years ago.

One shift gaining ground centers on supporting teachers more intentionally. Blending AI into teaching well goes beyond adding tools. It calls for instructors skilled in combining tech know-how with classroom insight - knowing when to lean on



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artificial intelligence without losing what only people can offer. Research from similar developing regions shows clear patterns: consistent training for educators makes all the difference. Without it, even costly ed-tech efforts often fail to lift student outcomes (Darling-Hammond et al., 2020).

6. Critical Discussion on Limits of Current Evidence and Missing Research

Looking closely at the research, you see clear gaps right away. What stands out is how few details there are on participant numbers - just one paper (Ali et al., 2024) clearly states 100 people took part. Because the others skip this info, judging reliability becomes guesswork. Even so, stronger issues come up when checking study structure. Not a single one used randomized groups or proper controls, which weakens any claim about cause and effect. While hints of progress show, calling results solid would be jumping ahead too fast.

This issue isn't limited to India alone. Across global higher education, research on artificial intelligence leans heavily on surveys where people describe their own experiences - Zawacki-Richter et al. discovered this in 2019 - rather than tracking real changes in what learners achieve. What's missing? Studies that compare performance before and after using AI, measuring actual progress instead of opinions. Such work would show if these technologies boost understanding, ability, or memory over time - not just how they're viewed by users.

One thing though - results from big-city campuses might not fit small-town art schools at all. Picture this: a college in a remote area works differently than elite tech institutes. So here's an idea - the next studies could pull data from varied places, not just the usual spots. Think beyond metros. Include rural zones, different subjects, less known institutions. That way, what we learn actually reflects the whole picture, not just one corner of it.

7. Conclusion

Looking closely at what's happening in Indian colleges, a clearer image comes into view - one where artificial intelligence quietly fits into teaching without taking over. From big universities to smaller ones, using varied software and research styles, patterns show up again and again. Tools powered by smart algorithms are spreading fast, not forced but welcomed. People see them helping students grasp ideas better while also easing paperwork loads on staff. These systems aren't tearing down old ways; instead, they slip beside lectures and tutorials like careful helpers. Even now, in these first stages, the mix feels balanced - tech lending support without grabbing control. Tradition still leads, yet makes space for digital partners. What grows here isn't revolution, but something slower, steadier. Culture matters, and familiar rhythms in classrooms stay intact even as change tiptoes in.

While promising, AI-powered blended education demands equal focus on systemic hurdles alongside tech advances. Not just tools but fairness shapes its real impact. Issues like uneven access, unclear teaching methods, privacy risks, and biased algorithms define who benefits - and who gets left out. India's 2020 National Education Policy opens space to tackle these gaps through adaptable, tech-integrated models rooted in equity.

One thing stands clear: fresh studies built with care matter most right now - tracking results over time, testing real classrooms, noticing settings where tools are used - not just hopes about progress, but proof of who learns, who gets left out, how fairness shifts, what moral weight these systems carry. India's massive reach, varied environments, long history of trying bold teaching ideas - it could shift from importing tech fixes made overseas toward shaping original insight into learning that keeps people at the heart, spreads chances fairly, stays grounded in reality.

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