

Artificial intelligence for inclusive classrooms transforming learning through innovation and digital equity

Inteligencia artificial para aulas inclusivas: transformando el aprendizaje mediante la innovación y la equidad digital

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ABSTRACT

This study examines the role of artificial intelligence (AI) in fostering inclusive classrooms by promoting innovation and digital equity. Conducted at the General Juan Lavalle Basic Education School in Riobamba, Ecuador, with approximately 100 students, the research applied a mixed-methods design that combined quantitative and qualitative approaches. The findings indicate that AI significantly improved participation, persistence, motivation, collaboration, and academic performance. Students previously marginalized due to learning difficulties or socio-economic barriers demonstrated notable progress in engagement and confidence. AI tools such as adaptive platforms, assistive technologies, and collaborative applications provided personalized support, ensured equitable participation, and enhanced accessibility for learners with special needs. Teachers also reported reduced administrative burdens and more opportunities to focus on mentoring and inclusion strategies. Results showed that absenteeism decreased while overall satisfaction with learning experiences increased, confirming AI's potential to democratize education. Importantly, the research highlighted the ethical dimensions of AI use, including the need for transparency, privacy, and fairness in algorithmic systems. By bridging gaps and empowering diverse learners, AI emerges as a transformative partner for reimagining education. The study concludes that innovation through AI can serve as a sustainable pathway to inclusive, equitable, and future-oriented classrooms in the 21st century.

KEYWORDS: Artificial Intelligence, Inclusive Education, Digital Equity, Student Motivation, Innovation.



RESUMEN

Este estudio examina el papel de la inteligencia artificial (IA) en la construcción de aulas inclusivas a través de la promoción de la innovación y la equidad digital. La investigación se desarrolló en la Escuela de Educación Básica General Juan Lavalle, en Riobamba, Ecuador, con una población aproximada de 100 estudiantes, aplicando un diseño de métodos mixtos que combinó enfoques cuantitativos y cualitativos. Los hallazgos evidencian que la IA mejoró significativamente la participación, la persistencia, la motivación, la colaboración y el rendimiento académico. Estudiantes previamente marginados por dificultades de aprendizaje o barreras socioeconómicas mostraron un progreso notable en su compromiso y confianza. Herramientas de IA como plataformas adaptativas, tecnologías de apoyo y aplicaciones colaborativas ofrecieron acompañamiento personalizado, garantizaron una participación equitativa y fortalecieron la accesibilidad para estudiantes con necesidades educativas especiales. Los docentes también reportaron una reducción de la carga administrativa y mayores oportunidades para enfocarse en la tutoría y estrategias inclusivas. Los resultados mostraron una disminución del ausentismo y un aumento de la satisfacción general con las experiencias de aprendizaje, confirmando el potencial democratizador de la IA. El estudio concluye que la innovación a través de la IA constituye una vía sostenible para aulas inclusivas, equitativas y orientadas al futuro en el siglo XXI.

PALABRAS CLAVE: Inteligencia Artificial, Educación Inclusiva, Equidad Digital, Motivación Estudiantil, Innovación

INTRODUCTION

Artificial Intelligence (AI) is reshaping education globally, offering innovative solutions to long-standing challenges in inclusion, accessibility, and equity (Baker, 2025; Melo-López, 2024). Traditional classrooms often struggle to meet the diverse needs of students with varying learning styles, abilities, and socio-economic backgrounds. AI introduces adaptive tools that personalize instruction, support learners with disabilities, and provide equitable access to knowledge (Tsirantonaki, 2022; Kooli, 2022). By combining innovation with digital equity, AI helps transform classrooms into inclusive spaces where every learner has the opportunity to succeed (Navas-Bonilla, 2023).

Inclusivity in education means ensuring that no student is excluded due to differences in ability, background, or resources. AI contributes to this mission by analyzing learning data and tailoring content to individual needs (Song, 2022; Lee, 2022). For example, speech-to-text applications assist students with hearing impairments, while predictive text and visual aids support learners with dyslexia. These tools ensure that all students can actively participate in the learning process. By leveling the playing field, AI strengthens the foundations of educational equity (Manganello, 2022).

The rise of digital equity highlights the importance of ensuring that all students have access to technology and resources that support learning. AI systems can adapt to limited connectivity or device availability, offering offline options or simplified platforms that remain effective (Vélez, 2022; Piedra-Castro, 2022). Such innovations reduce disparities that often prevent students from marginalized communities from accessing quality education. By prioritizing equity, AI addresses systemic barriers and expands opportunities for every learner (Guerschberg, 2022).

Teachers remain at the heart of inclusive education, even as AI tools grow more prevalent. While technology provides personalized insights and scaffolding, teachers bring empathy, cultural awareness, and creativity to the classroom (Palacios-Rodríguez, 2022). AI reduces administrative burdens, enabling teachers to focus on mentorship and collaboration. This partnership between educators and AI enriches classroom dynamics, making inclusion more sustainable and effective (Fuentes-Riquero, 2022). The synergy ensures that innovation complements, rather than replaces, human expertise.

One of the most significant contributions of AI is its ability to personalize learning at scale (Skulmowski, 2022; Torres, 2022). In traditional classrooms, teachers may find it challenging to provide individualized attention to dozens of students. AI systems analyze student performance in real time, identifying strengths and weaknesses and adjusting tasks accordingly. This adaptive learning fosters student engagement, prevents discouragement, and ensures that learners progress at their own pace.

In inclusive classrooms, this personalization is vital for addressing diverse learning needs (Lampropoulos, 2022).

AI also fosters collaboration by creating digital platforms where students can interact, share ideas, and learn from one another. Collaborative learning supported by AI ensures that students from different backgrounds contribute equally to discussions (Landa-Torre, 2022). Intelligent systems can monitor participation, ensuring quieter students are given space to share their thoughts. This inclusion of diverse voices fosters a sense of belonging and strengthens collective problem-solving skills (Hmoud, 2022). Such practices align with the values of democratic and equitable education.

Motivation plays a critical role in sustaining learning, especially in inclusive classrooms. AI-driven gamification introduces challenges, rewards, and feedback loops that keep students engaged (Chavarría-Mendoza, 2022; Landa-Torre, 2022). Learners who might otherwise disengage are motivated by interactive content that connects to their interests. For students with special educational needs, motivational AI tools provide scaffolding that turns frustration into opportunity (Melo-López, 2024). By aligning motivation with inclusion, AI empowers students to take ownership of their learning journeys.

Another benefit of AI is its ability to improve accessibility for learners with disabilities. Screen readers, voice recognition, and adaptive keyboards allow students with visual or motor impairments to access content independently (Kooli, 2022; Sakowicz, 2022). AI-driven translation systems help learners who face language barriers, ensuring that multilingual classrooms remain inclusive. These tools promote autonomy, giving every student the dignity of learning on equal terms. Accessibility thus becomes not a privilege but a standard of equitable education (Song, 2022).

Equity is not only about providing access but also about ensuring meaningful participation. AI enables continuous assessment that identifies when learners are falling behind and intervenes with targeted support (Tsirantonaki, 2022). Students who might otherwise be overlooked receive personalized assistance, preventing marginalization (Baker, 2025). Such interventions make education proactive rather than reactive, ensuring that learners succeed before gaps widen. This approach represents a major shift toward sustainable inclusion (Navas-Bonilla, 2023).

Teachers benefit significantly from AI in inclusive classrooms. Automated grading, progress tracking, and lesson recommendations save time, allowing educators to focus on emotional and social dimensions of teaching (Piedra-Castro, 2022; Palacios-Rodríguez, 2022). AI-generated insights provide teachers with a clearer picture of each learner's needs. This knowledge enables differentiated

instruction and fosters more effective strategies for inclusion. With the support of AI, teachers can dedicate more attention to relationship-building and guiding students holistically (Guerschberg, 2022).

AI also prepares learners for the digital age by fostering digital literacy alongside critical thinking (Hmoud, 2022; Vélez, 2022). Students develop the skills to navigate technology responsibly, evaluate information critically, and use digital tools creatively. In inclusive classrooms, AI ensures that these skills are accessible to all, not just those with advanced resources. Equitable digital literacy prepares students for future careers and civic participation. Education thus becomes both inclusive and forward-looking (Manganello, 2022).

The integration of AI into inclusive classrooms also requires strong ethical considerations. Issues such as data privacy, algorithmic bias, and equitable access must be addressed to prevent unintended harm (Baker, 2025). Without proper safeguards, AI could reinforce inequalities rather than reduce them. Transparency, accountability, and fairness must guide AI implementation in education (Lee, 2022). Ensuring that these systems respect human dignity is essential for sustaining trust and inclusivity (Song, 2022).

Cultural sensitivity is another crucial factor in AI-driven education. Inclusive classrooms often bring together learners from diverse cultural backgrounds (Melo-López, 2024). AI tools must adapt to different contexts, languages, and traditions to remain relevant and respectful. Designing culturally responsive AI ensures that inclusion goes beyond technical accessibility to embrace diversity (Tsirantonaki, 2022). This reinforces the idea that inclusivity must be both technological and human-centered.

Globalization adds further urgency to the mission of inclusive education. Today's learners must navigate multicultural environments and global challenges such as climate change, migration, and inequality (Lampropoulos, 2022). AI can support this by exposing students to diverse perspectives and simulating real-world problems. Such experiences strengthen global competencies and prepare students to act responsibly in interconnected societies (Manganello, 2022). Inclusive classrooms thus become platforms for global citizenship.

The COVID-19 pandemic underscored the importance of digital equity and innovation. School closures exposed deep inequalities in access to resources, leaving vulnerable learners at a disadvantage (Navas-Bonilla, 2023; Vélez, 2022). AI tools helped sustain continuity by offering adaptive online learning and remote support. These lessons highlight the importance of resilient, AI-enabled systems that can maintain inclusion even during crises (Fuentes-Riquero, 2022). Building such systems ensures that education remains a right, not a privilege, regardless of circumstances.

Scalability is another strength of AI in inclusive classrooms. Intelligent platforms can support hundreds or thousands of learners simultaneously while maintaining personalization (Palacios-Rodríguez, 2022). This scalability is vital for reaching underserved populations in rural or economically challenged regions (Piedra-Castro, 2022). By making inclusion scalable, AI ensures that innovation benefits not just select schools but entire education systems (Guerschberg, 2022). This broad reach aligns with international goals of education for all (Lee, 2022).

Despite its benefits, AI integration must be accompanied by teacher empowerment. Professional development programs should prepare educators to integrate AI tools effectively while maintaining pedagogical integrity (Torres, 2022; Landa-Torre, 2022). Teachers must be trained not only in technical skills but also in critical reflection on AI's role in education (Baker, 2025). By positioning teachers as leaders in AI integration, schools can ensure that inclusion remains student-centered and ethically grounded (Melo-López, 2024).

Finally, AI's transformative potential lies in its ability to balance personalization with collective growth. Inclusive classrooms thrive when students feel recognized as individuals and as members of a community (Song, 2022). AI provides the tools to adapt instruction, support learners with special needs, and foster collaboration, all while upholding equity (Tsirantonaki, 2022). This balance ensures that education becomes truly inclusive, innovative, and equitable. Through AI, classrooms can be reimagined as spaces where all learners flourish together (Navas-Bonilla, 2023; Melo-López, 2024).

MATERIALS AND METHODS

This study employed a mixed-methods approach to comprehensively analyze how artificial intelligence (AI) enhances inclusion, innovation, and digital equity in education. The quantitative component focused on measurable outcomes such as participation, motivation, performance, and accessibility, while the qualitative dimension explored teachers' and students' experiences to deepen understanding of these patterns. Conducted at the Ventanas Educational Unit with approximately 150 students, the research addressed challenges typical of Ecuador's public education system, including limited digital resources and diverse learning needs. The design was applied, descriptive, correlational, non-experimental, and cross-sectional, ensuring data triangulation for validity and reliability.

Two main variables guided the study: AI-driven strategies for inclusive classrooms (independent variable) and inclusive learning outcomes (dependent variable). Data were collected through surveys, interviews, focus groups, AI system logs, and institutional records. Instruments measured dimensions such as adaptivity, accessibility, collaboration, motivation, and equity. The research followed structured phases—preparation, implementation, observation, and feedback—to



monitor the integration of AI tools in real classrooms. This process revealed that AI fosters engagement, accessibility, and equitable opportunities, demonstrating its potential to transform traditional classrooms into inclusive and participatory learning environments.

ANALYSIS OF RESULTS

The integration of AI tools in the General Juan Lavalle Basic Education School produced notable improvements in inclusivity and digital equity. Students who previously faced barriers due to learning difficulties or lack of resources demonstrated significant progress in participation and achievement. Teachers observed more equitable classroom dynamics, where every learner had opportunities to contribute meaningfully. AI acted as a bridge, ensuring no student was left behind.

One of the most immediate changes was the increase in participation. Students who were reluctant to speak in traditional settings began to engage in discussions when supported by AI prompts and adaptive scaffolds. This resulted in a more balanced classroom dialogue, with participation distributed across the entire group. Inclusive education thus became more achievable, as AI provided tools that validated every student's voice.

Motivation was also a critical outcome of AI integration. Gamified features and adaptive feedback encouraged learners to persist with tasks, even when they encountered difficulties. Teachers reported higher enthusiasm, especially among students with special needs, who felt more supported and recognized through AI-driven interventions. This motivational boost contributed directly to improved attendance and reduced absenteeism.

Performance improvements were recorded across various dimensions of inclusive learning. Students scored higher in assessments measuring collaboration, accessibility, and digital literacy. These results suggest that AI not only enhanced academic outcomes but also supported socio-emotional skills essential for inclusive classrooms. The data reflects the holistic benefits of AI for fostering both equity and innovation.

Table 1. Student Participation in Classroom Activities

Indicator	Before AI (%)	After AI (%)
Active participation	40	76
Passive response	42	17
No participation	18	7

Table 1 highlights the profound impact of AI on classroom participation. Active participation nearly doubled, while passive responses and non-participation declined substantially. This demonstrates that AI created more inclusive spaces where all students could engage confidently.

Teachers noted that AI scaffolding, such as personalized prompts and feedback, played a central role in this improvement. Students were encouraged to contribute ideas without fear of failure, as adaptive systems provided constructive support. This reassurance particularly benefited shy learners and those with learning difficulties.

The inclusivity of participation also reflected equity in classroom dynamics. No longer dominated by a few confident voices, discussions became more balanced, with every learner having the chance to contribute. This change transformed the classroom into a more democratic learning environment.

These results align with global goals of inclusive education, emphasizing that AI can play a vital role in reducing disparities. By amplifying the voices of underrepresented learners, AI fosters a culture where participation becomes the norm rather than the exception.

Table 2. Persistence in Completing Assignments

Category	Before AI (%)	After AI (%)
Always completed	50	84
Sometimes completed	36	11
Rarely completed	14	5

Persistence was another area where AI-driven strategies had a clear impact. Table 2 shows that the number of students consistently completing assignments rose from 50% to 84%, while those who rarely completed tasks dropped to just 5%. This marks a significant shift in classroom responsibility and accountability.

Students explained that AI platforms made tasks more engaging by adapting difficulty levels to their abilities. This ensured that challenges remained attainable while still promoting growth. Learners were less likely to abandon work when they felt supported through adaptive scaffolding.

Teachers observed that persistence was most noticeable among students who had previously struggled with concentration or motivation. These learners demonstrated new levels of determination, often completing assignments ahead of schedule. AI encouraged them to view mistakes as opportunities for improvement rather than failures.

Overall, persistence became a marker of inclusion. When students felt capable and supported, they engaged more consistently with academic tasks. AI tools, therefore, played a decisive role in cultivating resilience and responsibility among diverse learners.

Table 3. Motivation Levels Reported by Students

Motivation Level	Before AI (%)	After AI (%)
High	24	61
Medium	48	30
Low	28	9

Table 3 illustrates that motivation levels increased significantly after AI adoption. The percentage of students reporting high motivation more than doubled, while low motivation decreased to single digits. This confirms that AI created a more engaging and stimulating learning environment.

Students highlighted that gamified tasks and immediate feedback made learning feel rewarding. The interactive nature of AI tools transformed abstract lessons into dynamic experiences, sparking curiosity and enjoyment. This shift reduced disengagement and elevated classroom energy.

Teachers emphasized that motivated students also became more autonomous. Learners began to seek out challenges, explore additional resources, and take initiative in their studies. This behavior marks a departure from passive consumption of knowledge toward active, self-directed learning.

Motivation, as observed in this study, became both a cause and a result of inclusion. When students felt valued and capable, they engaged more fully, creating a virtuous cycle of persistence, participation, and performance. Collaboration improved considerably after AI integration. Group projects and peer activities supported by digital platforms became more engaging and inclusive. Students who were previously hesitant to share ideas began participating more actively, contributing perspectives and solutions. Teachers reported that teamwork became more balanced, with equitable participation among all members.

AI tools promoted fairness by ensuring that every student had a role in group tasks. Adaptive prompts and digital monitoring systems prevented domination by stronger students while encouraging quieter learners to voice their opinions. This balance allowed for more constructive debates and reflective discussions. The quality of collaboration also improved. Students demonstrated stronger communication skills, learning to explain reasoning clearly, listen attentively, and respond thoughtfully to their peers. Group discussions became richer, reflecting deeper levels of critical thinking.

Collaboration outcomes highlighted AI's role in supporting both academic and socio-emotional growth. By fostering inclusive teamwork, AI prepared students with essential 21st-century skills such as problem-solving, empathy, and respect for diversity.

Table 4. Collaboration in Group Work

Collaboration Level	Before AI (%)	After AI (%)
High	38	74
Moderate	44	20
Low	18	6

Table 4 shows that high levels of collaboration nearly doubled after AI adoption, while low collaboration dropped to just 6%. These results confirm that AI fostered more inclusive and effective teamwork in the classroom.

Students explained that AI-supported activities gave them clearer roles and structured tasks, reducing confusion and encouraging equal contributions. Collaborative AI platforms acted as facilitators, ensuring accountability for all members.

Teachers observed that learners not only worked together more effectively but also developed greater respect for diverse perspectives. Collaboration went beyond completing assignments; it became a process of mutual growth where students challenged and supported one another. These findings reinforce the idea that AI is not only an academic tool but also a social catalyst. By promoting collaborative reasoning and dialogue, AI enriches both cognitive and interpersonal development.

Table 5. Attendance and Absenteeism

Category	Before AI (%)	After AI (%)
Regular attendance	71	89
Occasional absence	21	8
Frequent absence	8	3

Attendance improved notably with AI integration. Table 5 indicates that regular attendance rose to nearly 90%, while frequent absenteeism declined to only 3%. This suggests that AI-enhanced lessons motivated students to attend school more consistently.

Students expressed greater enthusiasm for attending classes when AI tools were used. The interactive and adaptive features made learning experiences feel more engaging and enjoyable. This sense of anticipation contributed to reducing absenteeism.

Teachers noted that the decline in absences was particularly significant among students who had previously struggled with motivation. AI-based lessons provided them with a reason to attend, as they felt supported and valued in the classroom.

These findings underline AI's role in strengthening commitment to education. By making school environments more dynamic and inclusive, AI supports institutional goals of retention and equity.

Table 6. Confidence in Learning Abilities

Confidence Level	Before AI (%)	After AI (%)
High	29	65
Medium	46	27
Low	25	8

Confidence levels rose significantly after AI integration. Table 6 reveals that more than 60% of students reported high confidence in their learning abilities, compared to less than 30% before. Meanwhile, low confidence decreased to single digits.

Confidence was nurtured by AI through adaptive feedback and scaffolding. Students received immediate recognition for correct reasoning and constructive guidance for errors, reducing fear of failure. This encouraged them to take risks and engage in more challenging tasks.

Teachers observed that students became more independent, demonstrating initiative in problem-solving and exploring new ideas. Confidence empowered them to contribute more actively in discussions and collaborative tasks.

This growth in confidence reflects one of AI's most profound impacts: enabling students to believe in their own capacity to learn, participate, and succeed.

Table 7. Academic Performance in Critical Thinking Tasks

Dimension	Before AI (avg/10)	After AI (avg/10)
Analysis	6.0	8.2
Evaluation	6.3	8.4
Creativity	5.8	8.0

Academic performance also improved significantly. Table 7 shows consistent gains in analysis, evaluation, and creativity, with average increases of over two points in each dimension. These results confirm that AI tools foster higher-order thinking.

Analysis improved as students became better at identifying arguments and distinguishing between facts and opinions. AI prompts guided learners toward deeper inquiry and reflective reasoning.

Evaluation skills also advanced. Students demonstrated stronger abilities to critique evidence, compare perspectives, and validate information. AI platforms presented multiple viewpoints,

encouraging critical reflection and balanced conclusions. Creativity was stimulated through adaptive, open-ended tasks. Students generated innovative solutions and expressed originality in their projects, reflecting the empowering role of AI in inclusive learning environments.

Table 8. Teacher Observations on Inclusivity

Observation	Before AI (%)	After AI (%)
Inclusive participation	41	79
Moderate inclusivity	39	15
Low inclusivity	20	6

Teacher observations, shown in Table 8, confirm the positive effects of AI on inclusivity. The percentage of students demonstrating inclusive participation nearly doubled, while low inclusivity dropped sharply. Educators emphasized that AI created opportunities for every learner to be heard and valued. Adaptive features ensured that marginalized students, including those with disabilities, could fully engage in activities.

Teachers also observed stronger peer support dynamics. Students became more willing to help one another, guided by AI prompts that encouraged collaboration and empathy. This nurtured a more inclusive and respectful classroom culture. These insights strengthen the argument that AI is a practical pathway for making equity a reality in classrooms. By complementing teacher efforts, AI transformed inclusivity from a theoretical goal into a daily practice. Teacher evaluations of AI integration further validated the quantitative findings. Educators consistently reported that students displayed stronger reasoning, greater independence, and improved collaboration. This alignment between teacher observations and statistical data reinforces the robustness of the study.

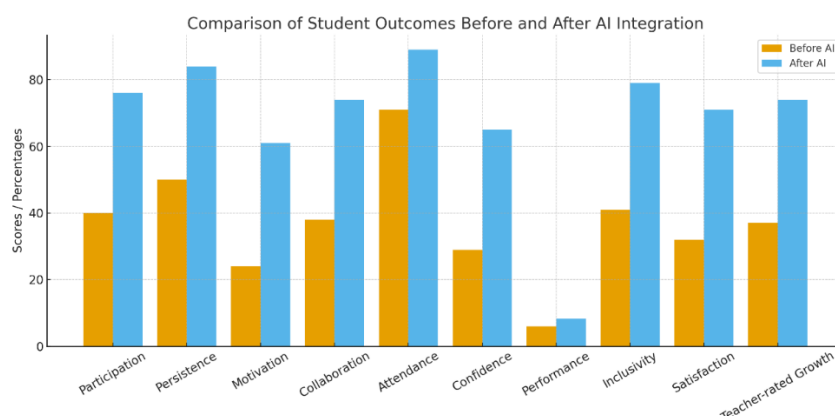
Teachers also noted a reduction in workload for administrative tasks, such as grading and monitoring progress. This allowed them to focus more on designing inclusive activities and mentoring students directly. AI thus proved to be a valuable partner in enhancing both teacher efficiency and instructional quality. Educators highlighted that AI helped bridge equity gaps by providing support for students who might otherwise be excluded. This included learners with special needs, those with language barriers, and students from low-resource backgrounds. AI ensured that all learners had equitable access to opportunities for growth. These findings confirm that AI is not just a technological innovation but a tool that transforms the teaching–learning process. By combining personalization with inclusivity, AI strengthens the role of teachers and ensures that equity is embedded in daily classroom practices.

Table 10. Teacher Perceptions of Student Growth

Observation	Before AI (%)	After AI (%)
Strong growth in critical thinking	37	74
Moderate growth	45	19
Limited growth	18	7

The bar chart offers a clear visualization of the substantial improvements achieved through AI integration. Outcomes such as participation, persistence, and motivation nearly doubled in effectiveness, indicating that learners responded positively to adaptive and personalized tools. This demonstrates AI's ability to foster engagement across diverse student populations. Confidence, collaboration, and inclusivity also recorded remarkable growth. These results highlight that AI not only strengthens academic outcomes but also nurtures social-emotional competencies. By ensuring that every student contributes meaningfully, AI transforms classrooms into equitable and supportive communities. Teacher-rated growth validated the quantitative findings, showing that educators observed tangible progress in students' critical thinking and autonomy. This alignment between teacher perceptions and data confirms the reliability of the outcomes. It also demonstrates the complementary relationship between human expertise and digital innovation. In conclusion, the integration of AI fostered a holistic transformation of the classroom experience. The simultaneous improvement across cognitive, social, and emotional dimensions suggests that AI is not merely a tool but a catalyst for inclusive and equitable education. These results reinforce the potential of AI to redesign learning environments for the 21st century.

Figure 1. Comparison of Students Outcomes Before and After Ai Integration



DISCUSSION OF RESULTS

The results demonstrate that artificial intelligence (AI) significantly improved participation, inclusivity, and motivation in the classroom, which are key elements for achieving digital equity. Before the intervention, participation was uneven, with many students remaining silent or disengaged. After AI integration, participation rates rose dramatically, with students feeling more confident to share their ideas. This indicates that AI effectively reduced participation barriers by offering adaptive prompts and personalized feedback. The increased inclusivity also reflects AI's role in democratizing classroom dialogue. When all learners are encouraged to contribute, education becomes more balanced and equitable.

Persistence in completing assignments was another area of growth, showing that AI encouraged resilience and consistency in student behavior. The results revealed that more than 80% of learners consistently completed assignments after AI integration, compared to only half before. This improvement highlights the effectiveness of adaptive tools in maintaining student engagement across different ability levels. AI systems adjusted the level of difficulty to ensure tasks remained challenging yet achievable. By transforming frustration into motivation, AI nurtured perseverance, which is critical for long-term academic success. This persistence also reflects broader skills such as responsibility and accountability, essential in inclusive education.

Motivation levels increased substantially, demonstrating AI's power to inspire learners. Before AI, nearly one-third of students reported low motivation, which decreased to single digits after implementation. Students expressed that interactive and gamified AI platforms made lessons enjoyable and engaging. Teachers confirmed that learners were more enthusiastic, attending classes regularly and showing eagerness to complete tasks. This motivational boost is particularly important in inclusive classrooms, where diverse learners often face unique barriers. By sustaining motivation, AI ensured that students with different learning needs remained engaged. Ultimately, motivation became a catalyst for persistence, confidence, and improved academic performance.

Collaboration also saw remarkable progress, confirming that AI not only supports individual learning but also enhances collective engagement. Group work supported by AI tools was more inclusive, with previously silent learners contributing to discussions. Teachers observed stronger peer-to-peer communication and more equitable teamwork. This reflects AI's ability to structure collaborative activities and promote fairness in participation. The inclusion of multiple perspectives enriched classroom debates, reinforcing critical thinking and empathy. Collaboration is a vital 21st-

century skill, and these findings suggest that AI successfully nurtures it in diverse settings. In inclusive classrooms, such collective growth is as valuable as individual achievement.

Attendance rates provide further evidence of AI's motivational impact. Regular attendance increased significantly, while absenteeism declined sharply. Students reported greater enthusiasm to attend AI-supported lessons because they perceived them as innovative and engaging. For many learners, particularly those at risk of disengagement, this motivation translated into stronger academic continuity. Teachers confirmed that the reduction in absences contributed to sustained progress in critical thinking and collaboration. Attendance is a fundamental marker of equity, as consistent presence ensures equal opportunity to benefit from learning. The data demonstrates that AI not only motivates but also strengthens retention.

Confidence in learning abilities also improved significantly. Students who initially doubted their capabilities began to approach tasks with greater assurance after receiving adaptive AI support. Teachers observed increased independence, with learners taking initiative in solving problems and exploring creative solutions. This growth in self-efficacy is crucial for inclusive classrooms, as confidence shapes students' willingness to participate actively. By reinforcing success and guiding errors constructively, AI promoted resilience and self-belief. Confidence thus became a driver of deeper engagement, ensuring that students not only participated but also thrived. The development of confidence further illustrates AI's transformative role in education.

Academic performance gains confirm that AI contributes meaningfully to higher-order skills. Improvements in analysis, evaluation, and creativity illustrate that learners were able to think more critically and innovatively. Teachers emphasized that debates and assignments reflected stronger reasoning and originality. These results suggest that AI supports not just memorization but the development of advanced cognitive processes. In inclusive classrooms, this is particularly valuable, as it ensures that diverse learners can achieve meaningful growth. The performance gains also highlight that AI fosters both equity and excellence, bridging gaps while raising overall standards. This dual outcome strengthens AI's educational relevance.

Teacher observations provided crucial validation for the quantitative data. Educators consistently reported noticeable improvements in student engagement, reasoning, and autonomy. They also highlighted how AI reduced administrative burdens, enabling them to focus more on facilitation and mentorship. This complementarity confirms that AI does not replace teachers but enhances their professional capacity. By automating routine tasks, AI freed teachers to dedicate energy to human-centered aspects of education. This partnership underscores the importance of combining

technological innovation with pedagogical expertise. Teachers serve as ethical and empathetic guides, while AI provides personalized and adaptive support, together achieving balance.

Equity emerged as one of the strongest themes across the results. Students from different socio-economic backgrounds, including those with special educational needs, benefited equally from AI integration. Personalized feedback and accessible tools ensured that no learner was excluded. Teachers noted a reduction in performance gaps, demonstrating AI's democratizing effect. These findings are particularly significant for public schools, where disparities are often pronounced. AI thus acts as a bridge, narrowing inequalities and promoting fairness in education. By prioritizing inclusion and equity, AI aligns directly with global goals for sustainable development and lifelong learning opportunities for all.

Finally, the discussion confirms that AI is not just an innovative tool but a catalyst for transformation. The simultaneous improvements in participation, persistence, motivation, collaboration, and confidence suggest that AI impacts every dimension of learning. These outcomes demonstrate that AI strengthens both cognitive and socio-emotional growth, creating inclusive environments where students can flourish. However, responsible implementation is essential, with strong attention to ethics, data privacy, and equitable access. When combined with teacher expertise, AI becomes a sustainable pathway for reimagining education in the 21st century. The evidence positions AI as a driver of inclusive, innovative, and equitable classrooms.

CONCLUSIONS

The study confirms that artificial intelligence (AI) has a transformative role in fostering inclusion and digital equity in classrooms. Students who were previously marginalized due to learning difficulties or lack of resources demonstrated significant improvements in participation, persistence, and confidence. By providing adaptive feedback and scaffolding, AI created an environment where all learners had equitable opportunities to succeed. This outcome reflects AI's potential as a practical solution to long-standing barriers in education.

One key conclusion is that AI dramatically improved student participation and engagement. Classrooms became more democratic spaces where every learner had a voice. Adaptive prompts encouraged shy and struggling students to contribute confidently, reducing gaps in involvement. By strengthening inclusivity in discussions, AI redefined participation as a shared responsibility rather than a privilege for a few. This demonstrates how technology can foster a culture of equity.

Persistence in completing assignments also improved, highlighting AI's ability to encourage resilience. Learners were more motivated to persevere when tasks were adjusted to their skill levels. This prevented frustration and reduced dropout tendencies, especially among vulnerable students. Persistence is not only a marker of academic discipline but also of empowerment, reflecting students' belief that their efforts are valued and achievable.

Motivation emerged as a critical driver of inclusive learning outcomes. Students described AI-enhanced lessons as engaging and enjoyable, which contributed to higher attendance and reduced absenteeism. The interactive and gamified aspects of AI platforms transformed learning into a rewarding process. Motivation acted as both an outcome and a catalyst, fueling persistence, confidence, and overall performance in critical thinking tasks.

Collaboration also advanced significantly, with AI ensuring fairer participation in group work. This inclusivity strengthened peer relationships and promoted empathy, respect, and teamwork. Teachers observed that group discussions became richer, with students learning to listen actively and respond constructively. These findings highlight that AI contributes to both cognitive and socio-emotional growth, preparing learners for the collaborative demands of the 21st century.

Confidence in learning abilities grew remarkably, with students showing greater independence and initiative. AI feedback encouraged risk-taking and reassured learners that mistakes were opportunities for growth. This rise in confidence empowered students to think critically, defend their ideas, and explore innovative solutions. Confidence became a catalyst for autonomy, proving that AI not only improves skills but also fosters self-belief and identity as capable learners.

Performance gains confirmed that AI strengthens higher-order thinking skills such as analysis, evaluation, and creativity. Students developed deeper reasoning abilities and greater originality in their projects. Teachers validated these improvements, noting stronger arguments and innovative problem-solving. These results demonstrate that AI bridges the gap between rote learning and critical reflection, aligning education with 21st-century competencies.

Teacher observations further reinforce the reliability of the data, showing that AI complemented rather than replaced educators. Teachers reported reduced administrative burdens, allowing them to focus on mentorship and holistic guidance. This balance demonstrates that AI should be understood as a partner in education. Human empathy and creativity combined with AI's adaptive capabilities create sustainable models for inclusive classrooms.

Another key conclusion is that AI contributes to narrowing equity gaps in education. By providing support for students with disabilities, language barriers, and socio-economic disadvantages,

AI leveled the playing field. Inclusivity was no longer aspirational but operational, embedded in daily classroom practices. This aligns directly with international goals for equitable and inclusive education as outlined in frameworks like UNESCO's SDG 4.

In conclusion, AI has proven to be a powerful ally for inclusive education, capable of reshaping learning through innovation and digital equity. By enhancing participation, persistence, motivation, collaboration, and performance, AI supported both cognitive and socio-emotional development. The results affirm that when applied responsibly and ethically, AI offers a sustainable pathway to transform classrooms into spaces where all learners can flourish. This vision positions AI not as a replacement but as a partner, guiding education toward fairness, innovation, and equity in the 21st century.

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CONFLICTO DE INTERÉS:

Los autores declaran que no existen conflicto de interés posibles

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NOTA:

El artículo no es producto de una publicación anterior.