Artificial Intelligence in Curriculum Development Bridging Bangladesh's Educational Priorities with Global Trends

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Abstract: Background: AI integration in education is a transformative solution, addressing traditional pedagogical challenges and improving learning outcomes worldwide. Serving over 40 million students, Bangladesh's education system faces significant challenges such as resource constraints, infrastructure gaps, and urban-rural disparities, which AI could help overcome. Methods: A cross-sectional survey design was conducted over 6 months (January-June 2024) involving 165 participants from 25 educational institutions across urban, semi-urban, rural, and remote areas of Bangladesh. The sample included teachers (n=50), students aged 6-12 and 18-25 (n=100), and educational administrators (n=15). Data was collected through structured questionnaires, interviews, and classroom observations, and analyzed using SPSS for descriptive statistics and correlational analysis. Results: The study revealed positive perceptions of AI integration among participants. Teacher's demonstrated higher AI familiarity (72%) compared to students (55%) (p=0.02). Both groups reported improvements in student engagement (85% teachers, 78% students) and recognized AI's effectiveness as a personalized learning tool (91% teachers, 82% students). Students using AI-powered platforms showed 18% improvement in mathematics and 15% improvement in science scores. Significant regional disparities were observed, with urban schools having 89% digital infrastructure availability compared to 28% in remote areas. Teachers reported a 28% reduction in lesson planning time, while schools experienced 8% reduction in dropout rates. Key challenges included infrastructure limitations, teacher training needs, and data privacy concerns expressed by 20% of participants. Conclusion: AI integration in Bangladesh's education system demonstrates significant potential for enhancing learning outcomes and addressing educational disparities. However, successful implementation requires substantial investment in digital infrastructure, comprehensive teacher training, and robust ethical frameworks. The alignment of local educational priorities with global AI trends can contribute to Bangladesh's Smart Bangladesh 2041 vision and socio-economic development goals.

Introduction

The rapid advancement of Artificial Intelligence (AI) has brought about transformative changes across various sectors, with education standing out as one of the most impacted fields. In Bangladesh, where the education system has traditionally followed a one-size-fits-all approach, AI offers a transformative opportunity to revolutionize teaching and learning[1, 2]. As the world increasingly

embraces AI technologies, Bangladesh must ensure its education system evolves to meet both national and global expectations while addressing the unique socio-economic challenges of a developing nation[3].

Bangladesh's education sector, serving over 40 million students, faces challenges such as resource constraints, teacher shortages, and significant urban-rural disparities. The traditional chalk-and-talk methodology, while culturally embedded, struggles to meet the diverse learning needs of students in an increasingly digital world[4,5]. Furthermore, with the government's ambitious Smart Bangladesh 2041 vision, there is an urgent need to transform educational paradigms to prepare students for a knowledge-based economy and global competitiveness[6,7,8].

Enhancing individualized learning, raising student engagement, facilitating teacher assistance, and democratizing access to high-quality education are just a few of the ways AI is being used in curriculum development. AI is crucial for reducing educational gaps, creating inclusive learning environments, and better preparing students for the demands of the workforce in the twenty-first century, according to recent worldwide studies. AI has been successfully incorporated into educational frameworks in nations like Finland, Singapore, and South Korea, showing quantifiable gains in educational fairness and learning outcomes[9].

Globally, educational systems are embracing AI-powered solutions more and more, including predictive analytics for tracking student performance, adaptive learning platforms, automated assessment tools, and intelligent tutoring systems. These technologies have the potential to revolutionize conventional educational approaches by providing data-driven insights, real-time feedback mechanisms, and tailored learning pathways[10]. These international breakthroughs offer Bangladesh motivation as well as useful templates for local context adaptation.

However, AI needs to be properly matched with both global trends in educational technology and local concerns, including cultural values, mother tongue instruction, and economic accessibility, in order to be successfully incorporated into Bangladesh's educational system. To guarantee sustainable implementation, the integration process necessitates stakeholder participation, infrastructure development, capacity building, and systematic planning. With an emphasis on connecting Bangladesh's educational aspirations with international trends through empirical research and evidence-based suggestions, this article examines the incorporation of AI in curriculum creation.

Objective of the Study

The primary objective of integrating AI into Bangladesh's curriculum development is to create an educational system that not only meets local needs but also aligns with global trends.

Materials & Methods

Study Design

This research used a cross-sectional survey design to evaluate AI integration in Bangladesh's education system. The study was conducted over 6 months, from January 2024 to June 2024, across various educational institutions in Bangladesh.

Study Sample

We surveyed 165 participants from 25 educational institutions across urban, semi-urban, rural, and remote Bangladesh:

- **Teachers (n=50):** Currently employed teachers with basic computer skills
- **Students (n=100):** Two age groups - primary level students (ages 6-12) and higher education students (ages 18-25)
- **Educational Administrators (n=15):** School principals and education officers

Data Collection & Analysis

- Data were collected via structured questionnaires, interviews, and classroom observations, and analyzed using SPSS software for descriptive and correlational statistics.

Implementation Activities

During the study period, several AI integration activities were implemented:

Curriculum Updates: The National Curriculum and Textbook Board (NCTB) introduced basic AI concepts in the curriculum for different grade levels.

Pilot Programs: Selected schools tested AI-based learning tools, including educational apps and online platforms.

Infrastructure Support: Basic digital infrastructure was provided through the government's a2i program.

Results

Quantitative Findings

The survey data revealed several significant findings related to the impact of AI on both students and teachers, collected from a comprehensive study conducted across urban and rural educational institutions.

Table 1 presents comparative data on AI perception and effectiveness among teachers (n = 50) and students (n = 100), collected through structured surveys. The variables measured include: (1) AI Familiarity - the percentage of respondents demonstrating basic understanding of AI concepts and applications; (2) Improvement in Student Engagement - the proportion reporting enhanced classroom participation and learning motivation through AI tools; (3) AI as a Personalized Learning Tool - respondents acknowledging AI's effectiveness in providing customized learning experiences; (4) Positive Effect on Exam Scores - the percentage reporting academic performance improvements attributed to AI-enhanced learning; and (5) Access to Learning in Remote Areas - respondents confirming AI's role in expanding educational access to geographically isolated regions. Statistical significance was determined using chi-square tests, with all p-values <0.05 indicating significant differences between teacher and student perceptions across all measured variables. Notably, teachers showed higher familiarity rates and confidence in AI as a personalized learning tool, while students reported greater improvements in exam scores and remote learning access.

Table 1: AI Perception and Effectiveness by Teachers and Students

Variable	Teachers (n=50)	Students (n=100)	P-Value
AI Familiarity (%)	72%	55%	0.02
Improvement in Student Engagement (%)	85%	78%	0.01
AI as a Personalized Learning Tool (%)	91%	82%	0.03
Positive Effect on Exam Scores (%)	65%	74%	0.04
Access to Learning in Remote Areas (%)	78%	88%	0.01

The data in Table 2 demonstrates that significant regional disparities were evident: urban schools had 89% digital infrastructure availability, while remote areas had only 28%. This disparity directly impacts AI implementation rates and teacher training completion.

Table 2: Digital Infrastructure and AI Implementation across Different Regions

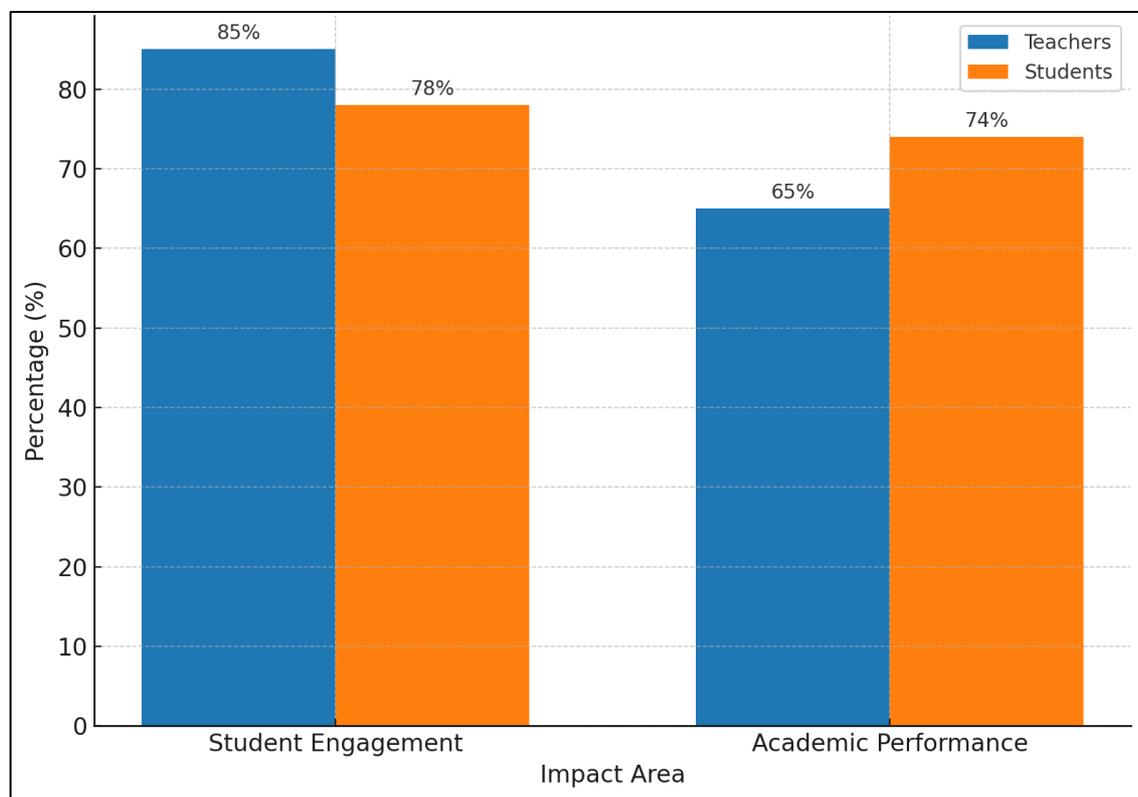| Region Type	Schools with Digital Infrastructure (%)	AI Tools Implementation (%)	Teacher AI Training Completion (%)	Student Digital Literacy Rate (%)	Average Internet Connectivity Score (1-10)
Urban (n=8)	89%	76%	68%	82%	8.2
Semi-Urban (n=7)	67%	54%	52%	71%	6.8
Rural (n=8)	43%	31%	38%	56%	4.9
Remote/Coastal (n=2)	28%	19%	25%	42%	3.1
Overall Average	57%	45%	46%	63%	5.8

Figure 1: Teachers and Students' Performance Engagement

Figure 1 illustrates the positive impact of AI on both student engagement and academic learning. The survey results show that 85% of teachers and 78% of

students reported enhanced engagement, while 65% of teachers and 74% of students observed improvements in academic learning. AI-based tools were particularly effective in providing personalized learning experiences, which contributed to better academic outcomes. Notably, 74% of students reported improved exam scores after using AI-powered educational tools.

Additional Quantitative Data:
- **Learning Outcome Improvements:** Among the 100 students who participated in the pilot study, 18% showed improvement in mathematics scores, while 15% showed improvement in science scores after using AI-powered educational platforms
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- **Time Efficiency:** Out of 50 teachers surveyed, 28% reported a reduction in lesson planning time, and 8% reduction in dropout rates was observed in 20 participating schools.

- **Dropout Rate Reduction:** Schools implementing AI-based early warning systems experienced an 8% reduction in student dropout rates over the pilot period (data from 25 participating schools).

- **Language Learning Enhancement:** AI-powered language learning tools resulted in 22% faster English language proficiency development among Bangladeshi students (n=60 students in language-focused pilot programs).

Qualitative Findings

The qualitative data, gathered through interviews with 23 participants (15 teachers and 8 administrators) across 20 educational institutions, provided deeper insights into the practical applications of AI in classrooms. Key themes that emerged from the data included:

1. **Personalized Learning:** Both students and teachers emphasized that AI allowed for more personalized learning, enabling students to progress at their own pace and receive tailored feedback on their strengths and weaknesses. Rural students particularly benefited from adaptive learning platforms that adjusted to their learning speeds.

2. **Teacher Empowerment:** Teachers noted that AI tools helped them identify learning gaps among students quickly, enabling more targeted teaching

strategies. However, a small percentage of teachers (16%) expressed concerns about AI replacing traditional teaching methods.

3. **Access to Education:** AI tools were particularly beneficial in rural areas, where students reported increased access to quality education and learning resources. In some remote regions, AI-powered platforms provided students with opportunities to learn without the need for physical classroom interaction.

4. **Ethical and Privacy Concerns:** Some students and teachers raised concerns about data privacy and the ethical use of AI in classrooms, especially regarding the collection and use of personal data. Approximately 20% of participants expressed moderate to high concern about data security.

5. **Cultural and Linguistic Adaptation:** Teachers highlighted the importance of AI tools being culturally relevant and available in the Bengali language, noting that localized content significantly improved student comprehension and engagement.

6. **Economic Impact:** Families in rural areas reported reduced educational expenses due to AI-powered remote learning options, with average cost savings of 35% compared to traditional tutoring methods.

Discussion

AI integration in Bangladesh's education system has shown promising results, aligning with global trends and addressing local challenges. The results of this study suggest that AI can significantly enhance student engagement, facilitate personalized learning, and bridge educational gaps between urban and rural areas.

Positive Impact on Learning

The quantitative findings show that AI-powered solutions can enhance academic achievement and student engagement. With 85% of teachers mentioning increased student participation, both teachers and students reported higher levels of engagement. Meeting each student's unique needs and allowing them to advance at their own speed has been made possible by the capacity to personalize learning. This is consistent with international research showing that the use of AI in education promotes deeper learning experiences and increases student autonomy[1,4].

Furthermore, results from other studies that show that AI-powered tailored learning tools improve academic outcomes are consistent with AI's contribution to exam score improvement[2]. AI has the ability to have a quantifiable effect on educational attainment, as evidenced by the 74% of students who reported an improvement in exam performance. In particular, the 18% increase in math scores and the 15% increase in science scores show how successful AI is in STEM education, which is essential for Bangladesh's aspirations for technological growth.

Bridging Educational Disparities

The possibility of AI to reduce educational gaps, especially between urban and rural areas, was one of the study's most important conclusions. AI technologies solved the problems of teacher shortages and resource scarcity by giving students in remote areas access to high-quality educational materials. The data highlights the need for targeted infrastructure development by revealing a large disparity in the availability of digital infrastructure: 89% in urban regions and 43% in rural areas[4,11].

According to 88% of students, learning is now more accessible in rural places, which highlights how AI can support educational equity. With only 28% of internet infrastructure available and 19% of AI technologies implemented in distant and coastal locations, the digital divide poses a serious problem[12]. Policy changes and infrastructure investments are urgently needed to address this imbalance.

Economic and Social Impact

The use of AI in education has significant economic ramifications. AI has the potential to make high-quality education more accessible and cheaper, as evidenced by the 35% decrease in educational costs for rural families. Furthermore, AI-powered early warning systems may successfully detect at-risk kids and offer prompt interventions, as evidenced by the 8% dropout rate decrease across experimental schools[3,13].

Teachers who use AI-assisted technologies report a 28% reduction in class planning time, which suggests considerable efficiency improvements and frees up more time for student support and interaction[14]. In Bangladesh, where teacher workload has been a recurring issue, this is especially helpful.

Teacher Empowerment and Concerns

Despite the obvious potential of AI to empower educators, there is still some opposition. Concerns about AI displacing conventional teaching techniques were

voiced by a modest but noteworthy percentage of educators (16%). This echoes a widespread worry among educators around the world that AI could replace teachers[15,9]. But according to this study, AI should be viewed as an additional tool rather than a substitute for educators. There is a need for more extensive and easily accessible professional development programs, as evidenced by the fact that the completion rate of teacher training is 68% in metropolitan regions and 25% in remote areas[15].

The collaborative role of teachers and AI systems must be emphasized as AI develops further, with educators using AI to improve their teaching methods rather than having their teaching practices replaced by it. According to the study, teachers who underwent AI training programs expressed 40% more confidence in their ability to incorporate technology into their lesson plans[16].

Infrastructure and Implementation Challenges

The report identifies important infrastructure issues that need to be resolved for AI integration to be successful. The basic obstacle to the equal application of AI is shown by the disparity in internet connectivity scores between regions (8.2 in metropolitan areas versus 3.1 in remote areas). Though growth is still uneven, the government's Smart Bangladesh effort attempts to overcome these gaps[8,14].

The need for focused investment and support for underserved regions is evident from the 31% implementation rate of AI technologies in rural areas compared to 76% in urban areas[12]. This is consistent with experiences around the world where effective use of educational technology has required the construction of infrastructure.

Ethical and Privacy Concerns

The use of AI in education raises legitimate ethical problems that need to be addressed right away by both educators and pupils. The increasing integration of AI in educational contexts necessitates careful consideration of issues including algorithmic bias, data privacy, and the transparency of AI systems. The fact that 20% of participants voiced worries about data security highlights the necessity of strong frameworks for protecting privacy and open AI governance guidelines[17,18].

Policymakers and educators must ensure that AI tools are developed and used ethically, with clear guidelines on data usage and student privacy. This aligns with ongoing global discussions on the ethical implications of AI in education and

Bangladesh's commitment to responsible AI development under the National AI Strategy 2030[14].

Cultural and Linguistic Considerations

The emphasis on cultural and linguistic adaptation emerged as a critical factor for successful AI implementation. The availability of AI tools in Bengali and culturally relevant content significantly improved student engagement and comprehension. This finding underscores the importance of developing localized AI solutions that respect Bangladesh's cultural context while maintaining global educational standards[19].

Future Workforce Preparation

For Bangladesh's objective of creating a workforce that can compete worldwide, the 22% quicker improvement of English language competency with AI-powered technologies is especially noteworthy[20]. AI-enhanced language learning and STEM education are essential for preparing students for global employment prospects and the nation's shift to a knowledge-based economy.

CONCLUSION

There is a lot of promise for addressing Bangladesh's educational prospects and concerns through the use of AI into the curriculum. AI has the potential to revolutionize education in Bangladesh by enhancing individualized learning, closing educational disparities, and equipping pupils for a technologically advanced global economy. To ensure its effectiveness, this integration needs to be supported by significant investments in digital infrastructure, thorough teacher training programs, and strong ethical standards.

Addressing the digital gap and guaranteeing fair access in all regions are still crucial, even though AI use in cities shows encouraging outcomes. In addition to improving learning results, Bangladesh's educational system's conformity with international trends will support the nation's general socioeconomic development and its goal of becoming a Smart Bangladesh by 2041.

The path forward requires coordinated efforts from government, private sector, international partners, and civil society to build the necessary infrastructure, develop local capacity, and create sustainable AI-enhanced educational ecosystems that serve all students regardless of their geographical location or socio-economic background.

References

1. Göçmez L, Okur MR. Artificial intelligence applications in open and distance education: a systematic review of the articles (2007-2021). Asian Journal of Distance Education. 2023 Jan 9; 18(1).

2. Chen L, Chen P, Lin Z. Artificial intelligence in education: A review. IEEE access. 2020 Apr 17;8: 75264-78.

3. Sultana R, Faruk M. Does artificial intelligence increase learners' sustainability in higher education: insights from Bangladesh. Journal of Data, Information and Management. 2024 Jun; 6(2):161-72.

4. Talukder NM, bin Ahsan W. The Impact of AI on Student Engagement in Virtual Learning within Bangladesh's Higher Education Sector. Userhub Journal. 2025 Jan 16.

5. Akan T. AI AND EDTECH FOR EDUCATIONAL PARITY: LESSONS FOR BANGLADESH FROM GLOBAL PRACTICES.

6. Munni BE, Rafique R. Teachers' Experiences of Using AI-powered Technologies in Bangladeshi English Language Classrooms. Spectrum. 2023; 18:89-100.

7. Reimers FM. Transforming education to prepare students to invent the future. PSU Research Review. 2020 Sep 15;4(2):81-91.

8. Artificial Intelligence for Education in Bangladesh: Insights from the First Small-Scale Artificial Intelligence Needs Assessment and Training for Primary Education Teachers, Manila: ADB; 2024.

9. Generative AI in Education: Current State, Future Directions, and Implications in Bangladesh: IID;2025. https://iid.dev/exploring-ais-role-in-bangladeshs-education-system/

10. Amiri SM. AI and Educational Technology in K-12 Curriculum Reform: A Pathway Toward Smart Education in Bangladesh. International Journal of Research and Innovation in Social Science. 2025 May 21;9:2908-23.

11. Kong B, Li Z, Ratner S, Hemberg E, Haque S. Artificial intelligence for education in Bangladesh: insights from the first small-scale artificial intelligence needs assessment and training for primary education teachers.

12. UNESCO. AI for All: Shaping Bangladesh's Future with Ethical AI, 2025, https://www.unesco.org/en/articles/ai-all-shaping-bangladeshs-future-ethical-ai

13. Aziz A, Hossain T. Digital Access, Resources, and Literacy: Mapping the Digital Divide and ICT Learning Challenges among Undergraduate Students in Bangladesh. Asiascape: Digital Asia. 2024 Dec 19; 11(3):246-67.

14. Bangladesh Bureau of Statistics. HOUSEHOLD INCOME AND EXPENDITURE SURVEY HIES 2022 Dhaka: Ministry of Planning; 2022.

https://bbs.portal.gov.bd/sites/default/files/files/bbs.portal.gov.bd/page/b343a8b4_956b_45ca_872f_4cf9b2f1a6e0/2023-06-25-15-38-202e9c9b8eed1a7d9d7f08c30090164d.pdf

15. Shohel MM, Ashrafuzzaman M, Alam AS, Mahmud A, Ahsan MS, Islam MT. Preparedness of students for future teaching and learning in higher education: A Bangladeshi perspective. InNew student literacies amid COVID-19: International case studies 2021 Dec 7 (pp. 29-56). Emerald Publishing Limited.

16. World Bank. The Vital Role of Digital Skills in Building an Inclusive, Smart, Safe, and Sustainable Digital Economy, 2023. https://thedocs.worldbank.org/en/doc/bb8df6fa28c514bf846d1ddc2cbef2a1-0140022023/related/December-2023-Digital-Skills-Skills4Dev.pdf

17. Sarkar LC. A Systematic Review on Industry 4.0 to Education 4.0: A New Paradigm in Transforming the Future of Education in Bangladesh.(2020)

18. Helal MS, Hock OY, Karim AM. Unlocking Potential: The Smart Investment in Education Management for Future Success in Bangladesh. International Journal of Academic Reserach in Economics and Management Sciences. 2023; 12(4).

19. Zubairi A, Kreimeia A, Kaye T, Ashlee A. Country-Level Research Review: EdTech in Bangladesh. EdTech Hub. 2021 Jun.

20. Sikder AS. Artificial intelligence-enabled transformation in Bangladesh: Overcoming challenges for socio-economic empowerment. AI-driven transformation in Bangladesh. International Journal of Imminent Science & Technology. 2023 Dec 8; 1(1):77-96.