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Integration of Technology in Special Education: Enhancing Institutional Effectiveness through AI-Driven Assessment and 360-Degree Evaluation-A Case Study of Proyash Institute of Special Education, Bangladesh

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Abstract: *The rapid integration of technology in education has revolutionized teaching and learning worldwide, yet its transformative potential in special education remains underexplored in the context of developing countries such as Bangladesh. This study investigates how technology can enhance institutional effectiveness through two flagship initiatives of Proyash Institute of Special Education and Research (PISER): A 360-degree evaluation system for teachers and service providers, and a tailored AI-driven assessment and Individualized Education Plan (IEP) generation model currently under development. Using a mixed-method design, data were collected from 195 teachers, 390 parents, and 65 administrative staff. Quantitative results revealed that the digital feedback system improved accountability, transparency, and professional growth. Qualitative insights highlighted increased collaboration and evidence-based decision-making. Conceptually, the AI model integrating multidisciplinary assessment data and predictive analytics has the potential to streamline student progress monitoring and personalize interventions. The paper concludes that when coupled with visionary leadership, such technologies can bridge gaps in inclusive education, foster equity, and redefine institutional excellence.*

Keywords: *Special Education, Bangladesh, 360-Degree Evaluation System, AI-Driven Assessment, Individualized Education Plan (IEP), Institutional Effectiveness, Inclusive Education.*

1.1 Introduction

Education in the twenty-first century is increasingly shaped by technology, which serves not only as a tool for efficiency but as a lifeline for learners with disabilities, enabling access to learning, communication, and participation in society. Bangladesh, as a signatory to the UN Convention on the Rights of Persons with Disabilities (CRPD), has made notable policy commitments toward inclusive education; however, implementation continues to face challenges due to resource limitations and insufficient specialized training. Established in 2006 under the Bangladesh Army with the motto *"Special Child, Special Rights,"* the Proyash Institute of Special Education has expanded to thirteen branches nationwide, serving more than 3,400 students with diverse disabilities. Recognizing that effective inclusion requires data-driven and digitally supported

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decision-making, the institute has initiated two flagship transformations: a 360-degree evaluation system (introduced in 2025) for teachers, therapists, and service providers, and a tailored AI-based assessment and Individualized Education Plan (IEP) generator currently under development. Together, these initiatives aim to strengthen institutional accountability, optimize interventions, and establish a national benchmark for special-needs education in Bangladesh.

1.2 Problem Statement

Traditional evaluation and assessment practices in special education remain largely subjective, fragmented, and paper-based, making it difficult to manage and synchronize the vast amount of information required for children with special needs. The absence of systematic data integration hampers effective monitoring of student progress, limits staff accountability, and constrains the scalability of evidence-based interventions.

1.3 Research Questions

a. How the 360-degree digital evaluation system affects teacher performance and institutional quality at Proyash?

b. What potential does the emerging AI-driven IEP generator hold for transforming special-education assessment in Bangladesh?

1.4 Objectives

a. To analyze the effectiveness of the digital 360-degree feedback system on professional growth and accountability.

b. To conceptualize the design and anticipated impact of the AI-driven assessment model.

c. To explore the relationship between technology integration and institutional effectiveness.

1.5 Significance of the Study

This study contributes to the expanding body of literature on technology-enabled inclusion by presenting an indigenous case from the Global South. It offers empirical evidence of organizational transformation within a military-administered institution that uniquely integrates discipline with compassion in the pursuit of inclusive education. Beyond documenting institutional change, the paper introduces a conceptual framework for AI-assisted personalized learning, which holds promise for advancing individualized interventions in special education. The findings have broader implications for national policy development under the Ministry of Education and the University Grants Commission (UGC) of Bangladesh, positioning technology-driven models as potential benchmarks for equity and institutional excellence in the country’s special-education landscape.

2.1 Literature Review

2.1.1 Technology and Inclusion

Assistive and adaptive technologies such as speech-to-text software, augmentative communication devices, and virtual-reality learning environments have proven to enhance engagement and autonomy (Scherer & Federici, 2015). Universal Design for Learning (UDL) advocates that digital tools should cater to diverse sensory and cognitive needs (Al-Azawei et al., 2016). Globally, technology has moved beyond accessibility toward *empowerment*, enabling students with disabilities to become active learners and creators.

2.1.2 Accountability and Teacher Evaluation in Special Education

Teacher effectiveness remains central to educational outcomes (Danielson, 2013). In inclusive settings, evaluation must capture multidimensional competencies pedagogical, therapeutic, and relational. A 360degree feedback system, incorporating inputs from supervisors, peers, subordinates, and service recipients (parents), is increasingly recognized for promoting reflection and professional growth (London & Smither, 1995). Digitalizing this system enhances transparency and reduces bias (Kumar et al., 2021). However, research in developing contexts shows limited adoption due to cultural hierarchies and technological barriers. The Proyash model thus contributes valuable empirical evidence of implementation within a structured institutional culture.

2.1.3 Artificial Intelligence (AI) in Educational Assessment

AI applications in education have expanded rapidly from adaptive testing and learning analytics to automated feedback (Zawacki-Richter et al., 2019). In special education, AI offers the unique advantage of integrating multidisciplinary assessment data (speech therapy, psychology, occupational therapy, neurological data, parents' feedback from home and teachers' classroom feedback) to generate Individualized Education Plans (IEPs). Such systems can predict skill trajectories, recommend interventions, and track progress longitudinally. Yet most existing solutions are Western-centric and expensive. Developing a locally tailored model, as attempted by Proyash, could redefine accessibility and contextual relevance.

2.1.4 Institutional Effectiveness and Digital Leadership

Digital leadership refers to an organization's ability to harness technology for mission fulfillment (Anderson & Dexter, 2005). In special education institutions, effective integration requires vision, collaboration, and continuous capacity building. Studies have shown that technology adoption correlates positively with teacher motivation, stakeholder satisfaction, and organizational performance (Fullan, 2020). The Proyash initiative aligns with this perspective by embedding digital accountability and AI supported decision-making into its governance model.

2.1.5 Theoretical Framework

The theoretical framework integrates the TPACK model to explain the alignment of technology, pedagogy, and content knowledge in technology-enabled special education. The Technology Acceptance Model (TAM) is used to conceptualize teachers' readiness, perceived usefulness, and adoption of AI-based tools. Service effectiveness is further examined through the SERVQUAL model, emphasizing quality dimensions in special education service delivery. Collectively, these frameworks underpin the implementation of an AI-driven IEP generator and 360-degree evaluation system, ensuring accountability, service quality, and personalized educational planning.

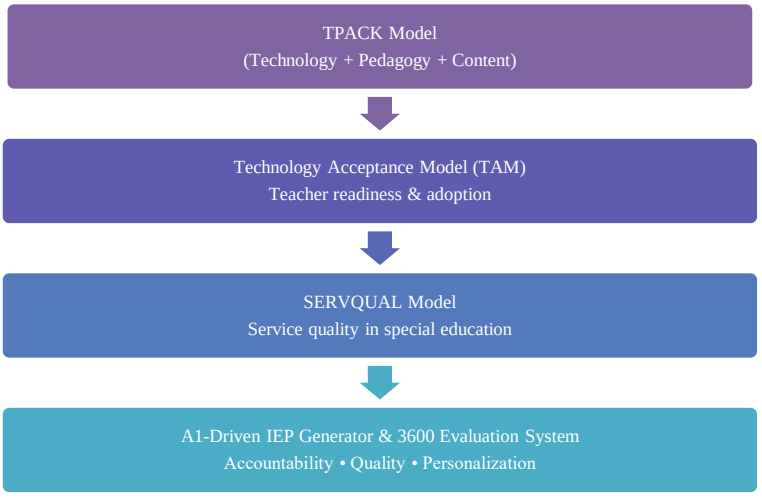

Figure 1: Theoretical Framework for Technology-Enabled Special Education

3. Methodology

3.1 Research Design

The study employed a mixed-method design combining quantitative survey data and qualitative interviews. The mixed approach allowed triangulation between measurable feedback patterns and interpretive insights on institutional transformation.

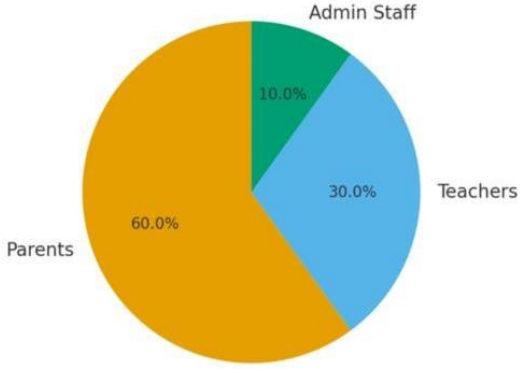

Figure 2: Composition of Participants by Category

3.2 Participants

A total of 650 respondents participated, comprising 195 teachers, 390 parents, and 65 administrative staff of Proyash Institute of Special Education and Research. Participants represented all special schools, inclusive schools, higher study faculty (PISER) as well as therapeutic departments and interventions clinic, ensuring comprehensive institutional coverage.

3.3 Data-Collection Tools

- Structured Questionnaires using Likert scales (1 = Strongly Disagree → 5 = Strongly Agree).
- Semi-structured Interviews with key administrators, senior special educators (head teachers and In Charges), heads of therapy departments.
- Digital Feedback Dashboard Logs automatically summarizing submissions.
- Observational Checklists for classroom technology use e.g. Digital Classroom.

3.4 Data-Analysis Procedures

Quantitative data were processed using descriptive statistics (mean, percentage, standard deviation) and visualized through bar, line, and radar charts. Qualitative data were thematically coded in NVivo and integrated narratively to support numerical patterns.

3.5 Ethical Considerations

Informed consent was obtained from all participants. Responses were anonymized. Approval was granted by the institutional ethics committee of Proyash.

4. Findings and Discussion

4.1 Overview

The results of the study are organized to reflect both measured evidence and forward-looking insights. This structure allows for a comprehensive understanding of system performance and innovation potential. The findings are presented in two complementary components: (i) Empirical outcomes derived from the implementation of the 360-degree evaluation system, and (ii) The conceptual and predictive potential of the AI-driven assessment and Individualized Education Program (IEP) generator.

4.2 Implementation of the 360-Degree Evaluation System

The system was introduced in mid-2025 and deployed digitally via the Proyash's website. Teachers were evaluated by superiors, peers, subordinates, and parents, producing a comprehensive profile of performance.

Table 1. Dimensions of 360-Degree Evaluation

Evaluation Dimension	Sample Items	Data Source	Weight (%)
Instructional Planning	Lesson objectives, adaptation	Peers	25

Student Engagement	Communication, empathy	Parents	20
Professional Discipline	Attendance, timeliness	Supervisors	20
Team Collaboration	Cross-disciplinary work	Colleagues	15
Innovation & Technology Use	Digital tools, creativity	Self + Admin	20

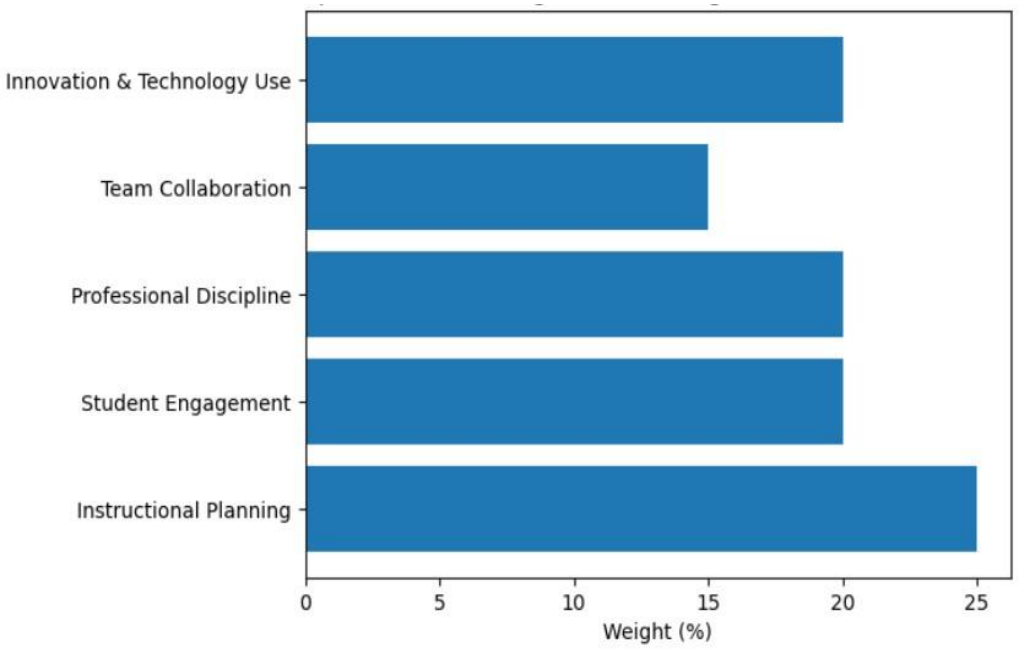

Figure 3: Horizontal bar chart showing relative weights; instructional planning highest at 25%.

The average overall satisfaction score across all respondents was 4.3 out of 5, indicating high acceptance and perceived fairness.

Table 2. Mean Scores across Stakeholder Groups

Dimension	Teachers (M)	Parents (M)	Admin (M)	Overall M
Instructional Planning	4.4	4.3	4.5	4.4
Student Engagement	4.1	4.4	4.2	4.2
Professional Discipline	4.5	4.2	4.6	4.4
Collaboration	4.3	4.2	4.3	4.3
Tech Innovation	4.0	4.1	4.3	4.1

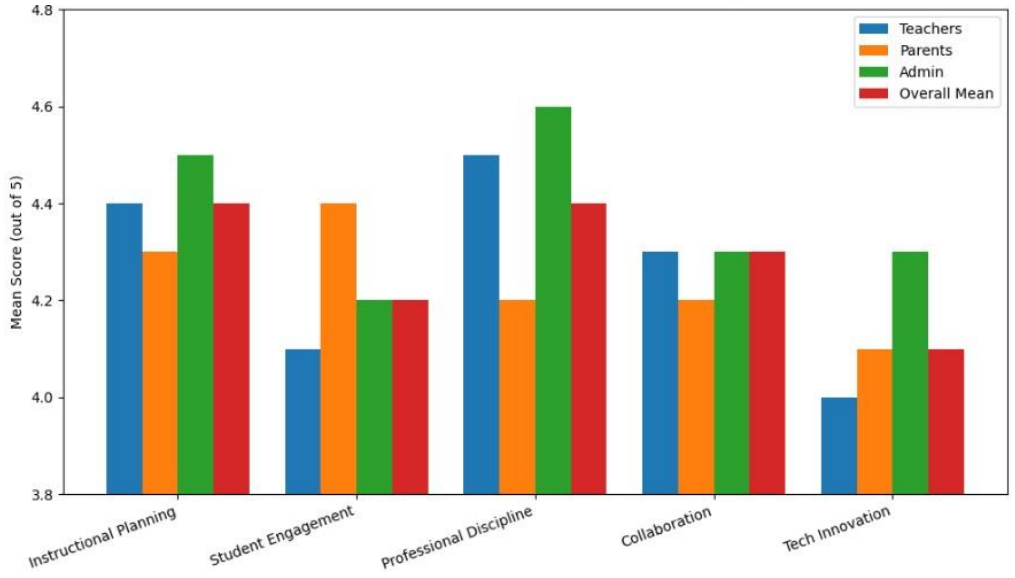

Figure 4: Clustered bar chart comparing scores by stakeholder group.

4.3 Qualitative Insights

Interview analysis revealed several emerging themes:

- **Enhanced Accountability:** Teachers reported being more conscious of punctuality and documentation.
- **Improved Communication:** Parents valued direct digital feedback channels.
- **Reflective Practice:** Peer evaluations encouraged lesson-sharing and mentoring.
- **Data Transparency:** Administrators could identify high-performing and support-requiring staff objectively.

4.4 Impact on Institutional Effectiveness

To measure organizational improvement, pre- and post-implementation metrics were compared.

Table 3. Key Institutional Performance Indicators

Indicator	2024 (Before)	2025 (After)	% Change
Teacher Attendance	88%	96%	+9.1
Lesson Plan Compliance	70%	90%	+28.6
Parental Satisfaction	72%	93%	+29.2
Peer Collaboration Frequency	60%	85%	+41.7
Use of Digital Tools	45%	82%	+82.2

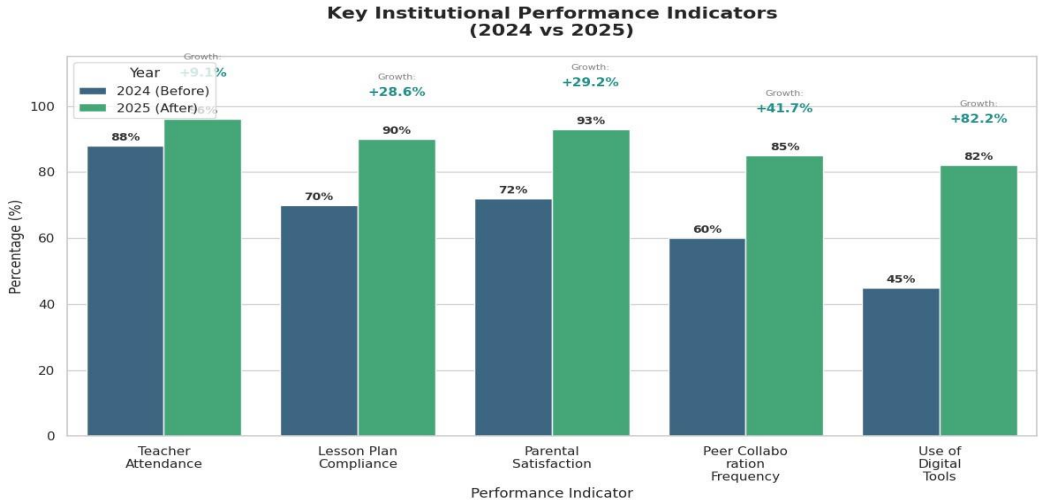

Figure 5: Pre and Post-Implementation Performance Indicators

The data clearly indicate that the 360-degree system strengthened institutional discipline, teacher motivation, and stakeholder satisfaction corroborating findings from London & Smither (1995) that multisource feedback promotes professional learning.

4.5 The AI-Driven Assessment and IEP Generation Model

The second focus area is conceptual yet grounded in ongoing development at Proyash. The AI-based system integrates assessment data from psychology, neurology, occupational therapy, speech-language pathology, physiotherapy, parental interview, home visit and classroom observations to auto-generate IEPs tailored to each student.

Table 4. Core Components of the AI-Based Assessment System

Module	Function	Input Data	Output
Data Integration Layer	Consolidates assessments	Multi-disciplinary reports	Unified Student Profile
Machine-Learning Algorithm	Pattern recognition	Historical scores	Skill prediction
IEP Generator	Auto-drafts goals	AI algorithms + teacher edits	Individual Plan
Progress Tracker	Visualizes outcomes	Termly updates	Dashboards
Feedback Loop	Continuous learning	Parent/teacher inputs	Adaptive refinement

The system shall use rule-based NLP to interpret assessment narratives and predictive analytics to forecast likely skill trajectories.

4.6 Expected Benefits

- **Consistency:** Eliminates subjective variability across evaluators.
- **Efficiency:** Reduces IEP preparation time by up to 60%.
- **Continuity:** Tracks long-term progress even if staff changed.
- **National Scalability:** Enables a unified digital database of special-needs students.

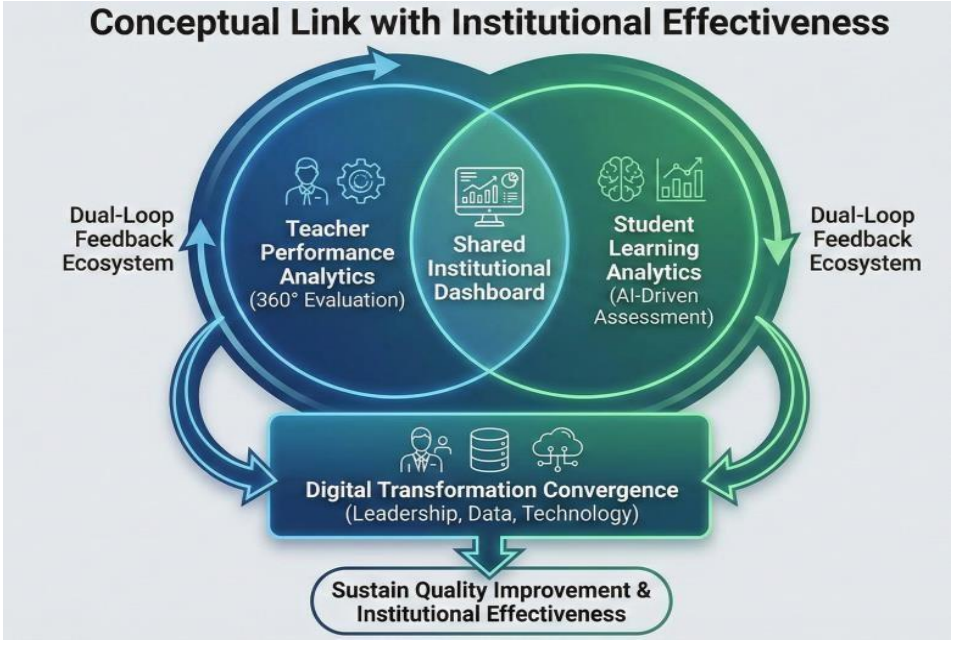

Figure 6: Two circle Venn diagram showing overlap between "Teacher Performance Analytics" and "Student Learning Analytics" shared Institutional Dashboard.

When combined, the 360-degree evaluation (staff) and AI-driven assessment (students) create a dual loop feedback ecosystem: This alignment exemplifies *digital transformation* where leadership, data, and technology converge to sustain quality improvement.

4.7 Comparative Discussion with Global Practices

While developed countries deploy AI-supported adaptive learning systems (e.g., DreamBox, IBM Watson Education), Proyash's initiative is distinctive in contextual adaptation and affordability. By leveraging open-source algorithms and local expertise, it offers a replicable model for other South Asian nations. Furthermore, the Proyash experience underscores digital leadership transforming not just tools but institutional culture. The integration of accountability (through 360-degree evaluation) and intelligence (through AI assessment) bridges the longstanding gap between teacher performance and student outcomes.

4.8 Summary of Findings

- The 360-degree digital evaluation improved accountability, collaboration, and communication.
- Empirical data showed measurable institutional performance gains.
- The AI-based assessment model under development promises to revolutionize personalized learning in Bangladesh.
- Together, these initiatives demonstrate that technology integration, guided by visionary leadership and inclusive philosophy, significantly enhances institutional effectiveness in special education.

5. Stakeholder Survey on the 360-Degree Evaluation System

To assess the reception of the newly introduced 360° evaluation mechanism at Proyash, an institutional survey was conducted through Google Forms in Bangla to address varying background of parents. Responses were collected from 650 participants, including teachers (195), parents (390), and administrators (65) across all branches.

5.1 Quantitative Findings

Satisfaction with the Evaluation System

Question: Are you satisfied with the newly introduced 360° evaluation system?

The survey results reveal an overwhelmingly positive response to the newly introduced 360° evaluation system, with nearly nine out of ten respondents (89.7%) expressing satisfaction. A significant majority, 71.4%, reported being very satisfied, highlighting strong enthusiasm and confidence in the system. Only a negligible 0.9% expressed dissatisfaction, while 9.4% remained neutral, suggesting limited resistance and room for further engagement. Overall, the findings demonstrate broad institutional acceptance and stakeholder trust in the effectiveness of the evaluation system.

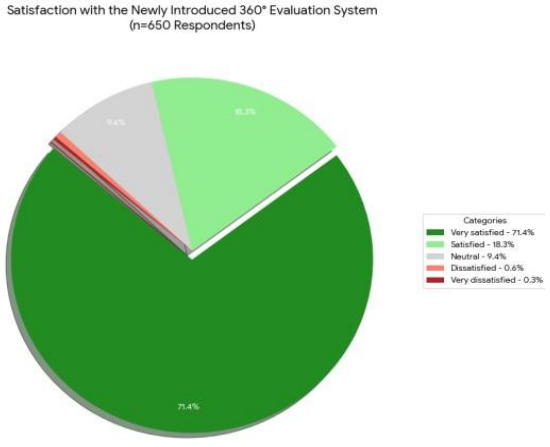

Figure 7: Satisfaction Level with Newly Introduced 360 Degree Employee Evaluation System

5.2 Perceived Empowerment

Question: Do you feel that this system has empowered you as it allows you to evaluate service providers?

The survey results clearly indicate that the 360° evaluation system has been highly empowering, with 95.8% of respondents affirming that it allows them to evaluate service providers. This overwhelming majority demonstrates that parents and teachers feel included in the institutional decision-making process, reinforcing their role as active stakeholders. The minimal 4.2% who disagreed suggests that resistance or disengagement is very limited. Overall, the findings highlight that the system fosters shared accountability and transparency, thereby strengthening trust and collaboration between management and stakeholders.

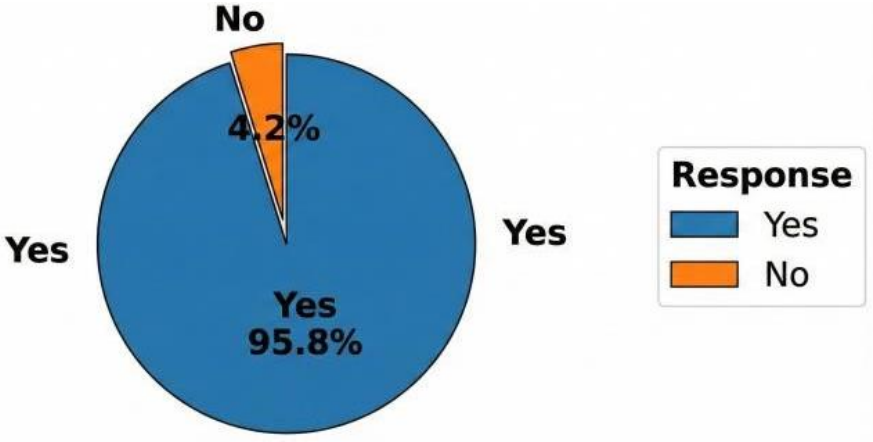

Figure 8*:* Perceived Empowerment

5.3 Qualitative Insights from Parent Feedback

An analysis of the open-ended survey responses reveals a rich dataset characterizing the stakeholder experience. The feedback reflects a dual narrative: high satisfaction with the current initiative alongside constructive, forward-looking recommendations for system evolution. The qualitative data has been coded into three primary themes:

Theme 1: Validation of Institutional Transparency

Parents and guardians expressed profound appreciation for the initiative, viewing the 360° evaluation as a significant step toward inclusivity and openness. The feedback affirms that the system is perceived not just as an administrative tool, but as a credible mechanism aligned with Proyash's core philosophy: *"Special Child, Special Rights."*

Key Sentiment

Figure 9 : Parent Feedback Word Cloud

"Alhamdulillah, our Proyash has brought remarkable transparency. Please continue this way; we believe our children will benefit." "Everything is fine. Excellent work."

Description: A visual representation of sentiment analysis shows the most frequently occurring terms including "Excellent," "Transparency," "Improvement," "Satisfaction," and "Accountability."

Theme 2: Strategic Recommendations for Scope Expansion

While acceptance was high, stakeholders provided granular recommendations to enhance the comprehensiveness of future evaluations. These suggestions focus on expanding the scope of evaluation and improving the user experience of the digital tools.

Key Suggestions Include

- **Expanded Criteria:** Inclusion of specific metrics for "Teacher's Performance", "In-Charge Cooperation", "Physical Activities," "Cleanliness," and "Classroom Environment."
- **Holistic Staff Coverage:** Extending the evaluation ecosystem to include support staff (e.g., attendants, drivers, and therapists) to reflect the full student experience.
- **System Features:** Requests for a dedicated comment box for qualitative remarks, functionality to review/edit submissions prior to finalization, and guaranteed anonymity to protect respondent privacy.

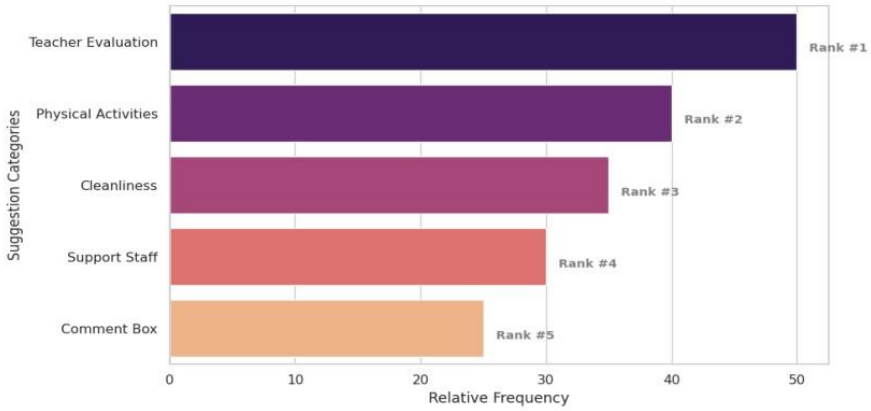

Figure 10: Suggestion for Enhancement

Theme 3: Systemic Maturity and Ethical Observations

The feedback indicates a high level of stakeholder maturity. Participants emphasized that the evaluation process should remain developmental rather than strictly judgmental. There is a clear desire for a nuanced approach that distinguishes between different faculty roles.

Key Observations

- **Differentiation:** *"Class teachers and subject teachers should be evaluated on different criteria."*
- **Process Integrity:** Suggestions to incorporate attendance data and strictly maintain anonymity to ensure honest feedback without fear of bias.
- **Internal Governance:** Proposals for a robust internal monitoring mechanism to ensure that the feedback leads to continuous improvement.

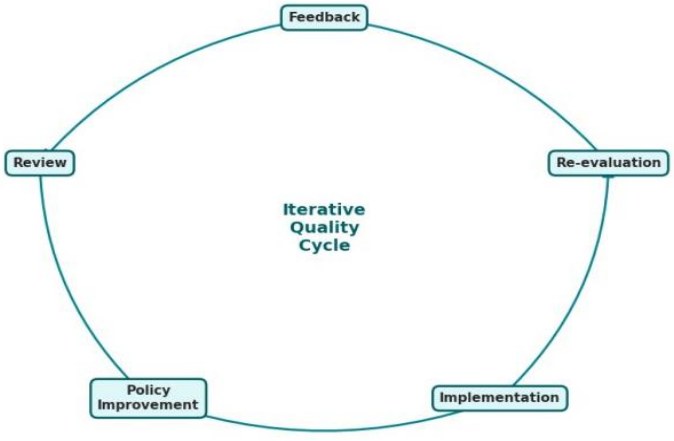

Figure 11: Proyash Evaluation Framework Cycle

5.4 Summary of Survey Insights

Table 5: Summary of Survey Insights

Aspect	Observation	Implication
Satisfaction Level	89.7% positive	Strong approval and system credibility
Empowerment	95.8% -Yes responses	Widespread sense of ownership
Additional Requests	Physical activity, cleanliness, attendants	Broader evaluation coverage needed
Ethical Concerns	Desire for anonymity and role-specific evaluation	Upgrade required for fairness and flexibility
Overall Feedback Tone	Overwhelmingly appreciative and constructive	System viewed as transformative

6. Challenges and Limitations

While the integration of digital tools at Proyash has yielded clear benefits, certain constraints persist:

6.1 Technical Challenges

The organization's digital systems show several operational limitations that affect overall efficiency. A strong dependence on consistent internet connectivity across regional branches means that any network disruption can slow down or halt essential processes. In addition, the limited integration of real-time analytics with Human Resource and Learning Management Systems (LMS) restricts timely decision-making and reduces the ability to track employee performance and development effectively. Furthermore, device compatibility issues and the need for additional training among some staff members create barriers to smooth adoption, increasing the time and resources required to fully utilize these systems.

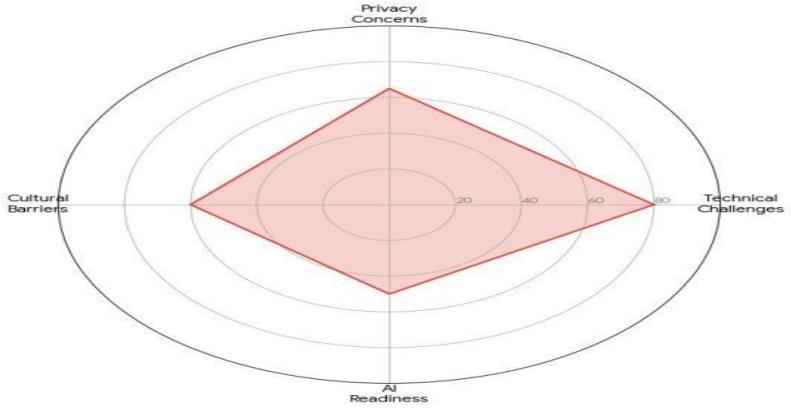

Figure 12: Challenges and Focus Area Capacity Building Needs

6.2 Organizational and Cultural Barriers

Initial hesitation among teachers who perceived 360° evaluation as surveillance rather than development. Balancing hierarchical discipline of a military-affiliated institution with participatory feedback culture.

6.3 Ethical and Privacy Concerns

Most of the respondents requested that evaluation be made anonymous to ensure honest feedback. Need to strengthen digital data protection under national privacy regulations.

6.4 Limitations of the AI System (Under Development)

- The AI-based IEP generator is in its prototyping stage; integration across therapy departments (psychology, occupational, speech) remains challenging.
- Limited availability of Bangla-language NLP datasets for contextual understanding of assessment reports.

7. Strategic Recommendations

The following recommendations are derived from empirical findings, survey insights, and comparative best practices:

a. **Enhance the Feedback Ecosystem:** The institution should expand the current feedback mechanism by adding specific evaluation fields for teacher performance, physical activity, cleanliness, and support staff, while simultaneously introducing an anonymous comment box and an option for parents to revise their submissions.

b. **Strengthen Digital Capacity and Leadership:** To ensure sustainability, management should conduct quarterly training on interpreting digital feedback constructively and establish dedicated "Digital Leadership Cells" within each branch to guide data-driven decision-making.

c. **Accelerate AI Integration and Localization:** The development of the AI system must be prioritized by finalizing the pilot of the IEP generator in three branches by 2026, creating contextaware Bangla algorithms, and fully integrating these analytics into the central institutional dashboard.

d. **Fortify Data Privacy and Ethical Governance:** Trust in the system should be secured by implementing strict encryption and anonymization protocols in compliance with ICT security standards, alongside the appointment of a "Guardian Feedback Ombudsperson" to review ethical concerns.

e. **Foster National and Global Partnerships:** Proyash should scale its impact by sharing this model with the UGC, ICT Division, and UNESCO Bangladesh for policy replication, while establishing research partnerships with universities to advance AI applications in inclusive education.

8. Conclusion

The experience of Proyash Institute of Special Education demonstrates that technology, when guided by ethical leadership and inclusive values, can transform institutional effectiveness in special education. The integration of a 360-degree evaluation system and a forthcoming AI-driven assessment model will surely enhance accountability, transparency, and evidence-based decision-making while remaining firmly grounded in the philosophy *"Special Child, Special Rights."* This case study affirms that visionary leadership, institutional culture, and intelligent technology can together create a sustainable pathway toward inclusive excellence.

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