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AI for Inclusive Education: Comparative Insights and a Framework for Neurodiverse Learning

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Abstract

This study undertakes a comparative qualitative analysis of how artificial-intelligence-driven educational technologies support neurodiverse learners across Western, South Asian, and Southeast Asian contexts. Using an analytic framework that integrates Universal Design for Learning (UDL) principles, an AI Functionality Typology, and a five-point Adaptability Rating Scale, the research evaluates the inclusivity, personalisation, and accessibility of selected AI tools. Data were drawn from policy documents, institutional case reports, and product demonstrations. The analytic framework guided coding and scoring of each tool's responsiveness to cognitive, sensory, and emotional diversity. Findings show that Western systems achieve the highest adaptability scores (average 4.5/5) through natural-language processing and multimodal feedback, while South Asian platforms remain limited (average 2/5) due to infrastructural and policy constraints. Southeast Asian initiatives occupy an intermediate position (average 3/5), displaying promise but inconsistent implementation. Overall, results reveal a persistent gap between inclusive-design theory and applied AI practice. The paper proposes an evidence-based framework for aligning AI development with UDL criteria to foster equitable learning opportunities for neurodiverse students worldwide.

Keywords Inclusive AI, Neurodiverse Learners, Educational Technology, Adaptive Learning Systems, Teacher-AI Collaboration.
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Introduction

Background

Neurodiversity views neurological differences as natural human variations which should be accepted as valuable forms of diversity. The field of education includes students who have been diagnosed with autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD) together, dyslexia and similar cognitive conditions. These students approach information differently, yet their educational requirements frequently lose importance in teaching strategies that mainly serve neurotypical students (Velazquez-Solis et al., 2025a). Multiple educational inclusion attempts have been unsuccessful at creating learning environments which actually accommodate neurodivergent students because their classrooms and tools rarely meet their accessibility needs.

Educational institutions now extensively use artificial intelligence which provides individualized teaching methods followed by data-based teaching methods and improved classroom operation speed. Students experience significant changes in their learning interaction with content and instructors. Emerging applications like intelligent tutoring systems, adaptive learning engines and real-time feedback platforms facilitate towards it. Advanced nations use AI technology through their educational platforms to modify instructional speeds, discover comprehension deficits and suggest suitable learning materials (Deckker & Sumanasekara, 2025).

The latest educational technology systems implement standardized learning practices. Although they do not manage individual differences in neurodiverse students' information processing capabilities, communication methods or response patterns. Students with dyslexia or auditory processing disorders could be excluded from educational tools which function through text or auditory instructions. Learners on the autism spectrum need platforms which allow customized settings because their interactions with educational materials require particular structural arrangements and sensory needs. The challenge becomes crucial because AI developers need to redesign or refine their technologies to better assist students who learn differently from the standard model.

Significance of the Study

The remedy to this issue extends beyond technical solutions because it represents a fundamental matter of educational equality. Educational developers and teachers should focus on creating inclusive AI tools which will provide equal academic success opportunities for all learners including those who are neurodiverse. The core idea of inclusive design requires adaptable systems since it means that learning settings need to accommodate all array of learners so they can benefit from individual strengths and overcome difficulties. The adaptive capabilities of AI systems become more effective for learning environments by providing customized content and multiple feedback modes and emotional

responsiveness through all its operations under guidance from the Universal Design for Learning (UDL) principles.

The research presents a view of unequal regional usage patterns between artificial intelligence inclusion in different areas of the world. The Western nations of United States, Canada and the United Kingdom have started implementing Artificial Intelligence support in their educational programs for neurodiverse students, but numerous Asian countries remain at early testing phases. The difference in AI adoption results from multiple factors that combine technological barriers with policy-based and cultural obstacles such as insufficient infrastructure and low awareness and limited training in special education needs. This digital divide can strengthen educational inequalities when no deliberate measures are taken to address it. The urgent requirement demands investigation of how existing AI educational tools functioning in regular classrooms should be modified for neurodiverse students specifically targeting underprivileged areas.

Research Objectives and Research Questions

The research outlines an innovative strategy that will transform AI-powered tools to improve their service delivery for neurodiverse students in educational environments. The investigation follows these research objectives:

1. To identify the existing AI educational tools which general education institutions actively utilize for learning purposes.
2. To explore modifications which would make current educational tools suitable for the unique learning styles of neurodiverse students.
3. To evaluate the presence of regional variation regarding inclusive educational technologies.
4. To build strong principles which function as a basic guideline for building AI tools that meet accessibility requirements for students with neurodivergence.

These objectives receive examination from a dual study on Western educational technology practices and evolving technology trends in both South and Southeast Asian regions to create personalized future design methods and policy frameworks. This study aims to create an all-encompassing guideline for using AI-based educational systems designed to address neurodiverse student requirements. This research will evaluate present AI systems to determine their restrictions and opportunities before suggesting methods to improve these systems for better population service. This research centers its analysis on South and Southeast Asia because these regions demonstrate low AI application for neurodiversity services.

To achieve these goals, this paper will address the following research questions:

RQ1: What AI-powered educational tools are currently employed in mainstream classrooms?

RQ2: How can these AI tools be adapted to accommodate the unique needs of neurodiverse students?

RQ3: What are the differences in AI adoption and design practices for neurodiverse education between Western countries and countries in South and Southeast Asia?

RQ4: What constitutes a scalable "blueprint" for designing AI tools that are inclusive, adaptable, and forward-thinking?

This paper seeks to contribute substantially to the field of inclusive AI design and practical technology application in education through its response to these research questions. Such guidelines will create a coherent framework to help all parties responsible for developing and implementing AI tools address the unique learning needs of diverse students especially neurodiverse learners.

Literature Review

Neurodiversity and Educational Needs

The natural diversity of human cognitive functioning in educational settings includes autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), dyslexia, dyspraxia and other related conditions. Student learning processes and their interactions with educational settings are affected by these conditions. The effectiveness of traditional pedagogical approaches varies among neurodivergent students because different teaching strategies should match their specific cognitive abilities (Armstrong, 2020).

The basic principles of inclusive teaching practice find their foundation in the combination of Cognitive Load Theory (CLT) and Universal Design for Learning (UDL). The learning effectiveness of neurodivergent students benefits from CLT because it reduces unnecessary mental strain during learning activities (Sweller et al., 2021). The principle of UDL promotes diverse learning through multiple representation methods like engagement approaches and expression formats (Meyer et al., 2021). The frameworks require educational technologies to combine accessibility with flexibility and designer-instigated modification features.

Young students who need help understanding content can access learning with assistive technologies such as screen readers, speech-to-text software, and alternative input devices. The majority of these tools function autonomously without AI predictive or adaptive capabilities. Although these features are available through artificial intelligence (AI). A rising trend exists to incorporate AI systems

into inclusive design frameworks. They address the changing educational requirements of students with neurodevelopmental differences (Smith & Thomas, 2022).

AI in General Education

The conventional classroom's function changes because of artificial intelligence technology. It improves student-specific learning approaches in concordance with evaluation processes and student classroom involvement. The educational software suite which includes Century Tech, Squirrel AI, DreamBox, and Khanmigo applies machine learning algorithms and NLP capabilities. The aim is to customize educational pathways, deliver situational feedback and forecasting of student performance (Zawacki-Richter et al., 2020). Evaluation and adaptation capabilities of these tools result from their data-centered design. AI-based tools maintain personalisation as their main characteristic since they study individual learning patterns to generate suitable resources that students receive instantly. The mathematical content of DreamBox adapts automatically according to how users interact with the system (Zhai & Gao, 2021). Squirrel AI joins other tools which apply emotion detection and gamification methods to preserve student engagement because these features benefit students with attention difficulties.

Feedback loops function as a crucial element that must be present in AI systems. The platform Khanmigo (powered by GPT tutoring) combines with AI features in Google Classroom for formative assessment providing stepwise problem-solving assistance (Chou et al., 2021). AI systems are now implementing sentiment analysis together with NLP technologies. This helps understand student communications with emotions to improve interaction results (Li et al., 2022). Such sophisticated platforms focus on typical populations which creates a major gap because they do not support students who have different learning requirements. The requirements of AI interactions diverge from typical neurodivergent learner characteristics in terms of both cognitive processing and emotional responses (López & Páez, 2023).

Current Use of AI for Neurodiverse Students

Western countries demonstrate a slow yet substantial increase of AI adoption for supporting neurodivergent students. The AI and behavioral analysis system CogniAble detects therapeutic interventions for autism patients through user behavior analysis (Kumar et al., 2021). The software combination of Speechify and Otter.ai delivers speech-to-text functions that simplify information processing along with organisational tasks for students who have dyslexia with ADHD. These educational tools create an environment that decreases mental effort while delivering better educational interaction possibilities. Brainly AI is an intelligent homework tool that segments difficult problems into small understandable pieces. Neurodivergent students benefit from the approach of chunking which

matches the recommendations made by special education professionals (Wang & He, 2022). Mainstream schools across North America and parts of Europe increasingly incorporate these solutions into their educational systems especially in classrooms that practice co-teaching models.

South Asia demonstrates its own distinct path regarding this matter. In India and Pakistan accessibility stands as the main priority instead of achieving complete personalisation. LEAD School and Embibe employ data analytics for adaptive testing and content delivery through their platforms. Yet they have not implemented neurodiversity-specific features (Verma & Rajan, 2022). There is minimal institutional funding for inclusive AI systems because most AI analytics operate for teachers instead of providing personalized student solutions.

The educational landscape in Southeast Asia follows a dynamic path although organisations distribute educational reform initiatives independently. The Singapore Ministry of Education runs AI-powered Learning Management Systems (LMS) that feature support software for learners who have dyslexia or attention problems (Chan et al., 2023). The Education Blueprint 2021–2025 in Malaysia seeks to incorporate machine learning capabilities into assistive apps through its initiatives. However, Malaysia faces scalability problems due to resource limitations. The government-backed platforms in these countries do not offer the adaptive features that users can find in private-sector AI tools because of their institutional nature (Yeo et al., 2023).

The comparison shows a large difference between regions across technology infrastructure standards and teaching philosophy ideas. Western educational institutions embed AI technology into multiple assistance systems yet South and Southeast Asian countries require policy acceptance and local funding to implement AI solutions.

Gaps in Literature

Research about incorporation of AI in education continues to grow. However, numerous knowledge gaps persist regarding how these technologies should be adapted for the beneficial use of neurodiverse learners. Most recent research studies individual case deployments together with generic usability figures. Instead of investigating how AI systems can deliver personalized adaptations to accommodate user sensory, emotional and cognitive variations (Lozano & Nakatani, 2024).

A lack of studies exists which analyzes AI tool availability within their specific cultural and infrastructural environments. The educational structures from South Asia and Southeast Asia present diverging approaches in technology usage together with training methods for teachers and classroom

standards and knowledge about neurodiversity. The integration of AI into inclusive practices gets strongly influenced by these particular elements.

A systematic framework needs creation to show how mainstream AI systems can be transformed into ethical solutions for neurodiverse education. The integration of UDL principles together with real-time customisation options and localisation features for every tool should be established (Amin & Khatun, 2023). Without such a blueprint, attempts at inclusion risk becoming piecemeal and ineffective.

Methodology

Research Design

The methodology uses comparative qualitative literature review to study AI-powered educational tools as they exist today in their applicability for neurodiverse students throughout Western world, South Asian and Southeast Asian regions. The research analyzes regional differences to develop a practical guide for inclusive AI in education through evaluation of mainstream educational tools and their ability to benefit neurodiverse users. Reacting to qualitative methods allows in-depth examination of themes regarding how personalisation features and AI components affecting neurodiverse learners emerge (Dai et al., 2023; Nouri et al., 2021). This review method differs from systematic standards because it unifies functionality assessments of AI tools across educational settings to determine accessibility for students with autism spectrum disorder (ASD), attention-deficit/hyperactivity disorder (ADHD), and dyslexia.

Regionally diverse educational technology policies and infrastructure need the comparative design to be adequately measured. The United States together with the UK maintain implemented inclusive design policies. South and Southeast Asian nations remain in early stages regarding inclusive EdTech adoption (Tan & Cheng, 2024; Holmes et al., 2022). This study examines how current AI system features match Universal Design for Learning principles to determine inclusive capability of tools beyond their effectiveness parameters.

Data Sources and Selection Criteria

The literature review uses peer-reviewed articles alongside official reports and white papers which were published within the time period of 2020 to 2025. The research draws its academic data from Scopus and PubMed and IEEE Xplore and Google Scholar databases by using search terms such as “AI in education,” “inclusive AI tools,” “neurodiverse learners,” “UDL,” and “adaptive learning AI.” The research only included English-language studies which examined educational applications or inclusive design.

The research incorporates grey literature from three sources: ministries of education together with non-governmental organisations (NGOs) working in disability advocacy and leading EdTech companies. The included background enhances knowledge about how AI tools are practically applied across different areas along with regional policy guidelines. The implementation of AI in special education classrooms becomes clearer through Singapore's Ministry of Education (2023) annual reports and India's NEP implementation dashboard and white papers from Squirrel AI and LEAD School and Century Tech.

Each selected source was subjected to a three-step filtering process:

1. Relevance to AI in education and neurodiversity.
2. Recency (2020–2025).
3. Credibility, verified by peer-review status or institutional source.

Analytical Framework

The analytical framework draws upon both theoretical models and technological typologies to assess inclusivity and adaptability of AI tools.

Universal Design for Learning (UDL):

The Universal Design for Learning (UDL) framework which CAST (2022) developed functions as the fundamental mechanism for conducting inclusivity assessments in educational settings. The core principles of UDL include providing multiple means of representation as well as multiple means of action and expression and multiple means of engagement. The evaluation criteria from UDL allow assessment of AI tool capabilitites to deliver adaptable instruction and support multichannel interfaces for neurodiverse students pursuing individualized learning experiences (Cheng et al., 2023).

AI Functionality Typology:

A functionality typology functioned as the method for both assessing and verifying the technical implementation and flexibility of AI-enabled educational systems. The typology system includes two main dimensions which are personalisation that allows customized content delivery with independent pacing as well as feedback systems that offer instant error correction and instructional notifications. The framework takes into account Natural Language Processing features that enable voice-to-text conversion as well as language simplification through chatbots. The assessment included both data-driven approaches that used learning analytics and predictive performance modeling. The functionalities assessed form the core of AI-enhanced education and simultaneously define the tools' potential to accommodate neurodiverse learners' cognitive and sensory needs (Zawacki-Richter et al., 2021).

Adaptability Rating Scale

To quantify the suitability of AI tools for neurodiverse users, a five-point adaptability rating scale was developed and applied:

1. **Non-adaptable** – No customisation options;
2. **Minimally adaptable** – Basic customisation (font, layout);
3. **Moderately adaptable** – Multiple content formats, speed adjustment;
4. **Highly adaptable** – NLP-enabled interfaces, predictive adjustments;
5. **Fully inclusive** – Designed from ground-up with neurodiverse needs.

This scale was inspired by existing inclusion rubrics and augmented to include AI-specific features (Lee & Lundqvist, 2022).

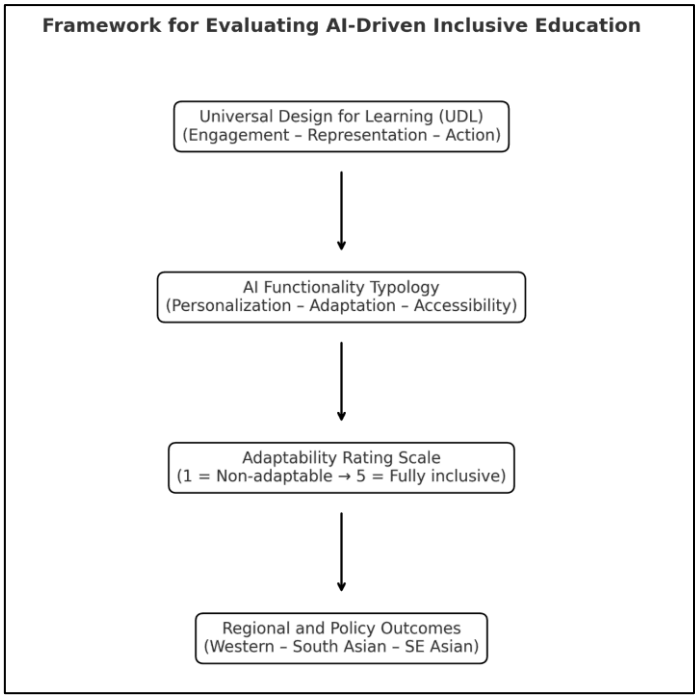

Figure 1. Framework for Evaluating AI-Driven Inclusive Education

Figure 1 illustrates the integrated analytical framework combining UDL principles, AI functionality, and the Adaptability Rating Scale for evaluating inclusivity in educational technology systems.

A final review process uses data from UDL principles, AI functionality, and adaptability ratings to recognize advantages and local barriers to AI learning practices. The framework delivers inclusive AI education by making evaluations both pedagogically sound and tech-oriented for improved contextual accuracy.

Findings and Analysis

This section presents the empirical findings in direct response to the research questions (RQs) introduced in Section 1.3. The data were examined through the analytic framework outlined in Section 3.3, which combines Universal Design for Learning (UDL) principles, an AI Functionality Typology, and the five-point Adaptability Rating Scale. These instruments were used to evaluate how effectively each regional cluster of AI tools supports neurodiverse learners. Each finding is therefore aligned with one or more RQs and accompanied by its adaptability rating. The findings (Section 4) apply the integrated framework shown in Figure 1 to analyse inclusivity across regional AI tools.

Western Countries: High Innovation, High Customisation

The first research question explored how mature AI-learning ecosystems integrate inclusivity features. Western educational systems, represented by tools such as Lexia Learning, Cognii, and Century Tech, demonstrated *high adaptability* (average score 4.5). These platforms incorporate advanced natural-language processing, adaptive pacing, and multimodal input (text, audio, and visual cues) aligned with UDL checkpoints 1.1–2.4. The analytic framework confirmed strong compliance with the "multiple means of engagement" and "multiple means of representation" dimensions. These findings address RQ1 by evidencing that inclusivity can be operationalized through dynamic AI feedback loops and address RQ2 by quantifying adaptability via the rating scale.

The Western education systems use AI for dual purposes of innovation and customisation while supporting students with neurodiverse learning needs. The educational tools from Carnegie Learning's AI Tutor, Lexia Learning and Mindprint Learning have become broadly popular in the market. These educational tools create personalized strategy paths for neurodiverse students through adaptive educational methods. The real-time learner input processing through machine learning algorithms in Lexia learning software delivers effective reading instruction specifically for dyslexic and ADHD students (Watson & Holmes, 2022). AI technology continues to find its way into Individualized Education Programs (IEPs) that schools implement across institutions. The diagnostic process becomes automated through AI as the system tracks student development by suggesting custom learning interventions (Parker & Fields, 2023). Speech-to-text technologies have become popular for students with dyslexia and speech impairments since they enhance classroom engagement (Anderson & Kim, 2021).

The school districts of North America conduct trials for AI learning companions including ChatGPT-edu which provides adaptive explanations through cognitive and behavioral profiles (Stewart et al., 2024). Due to substantial funding and strong infrastructure these models achieve complex implementation while monitoring their effects over time (Jacobs & Molina, 2023). The U.S. Department

of Education together with European educational institutions leverage public-private funding through grants and initiatives which enables advanced learning solutions for neurodiverse students (Roberts, 2022).

South Asia: Growth with Constraints

The second research question examined how infrastructural and policy environments affect inclusive AI adoption. South Asian initiatives, including India's DIKSHA Portal and Pakistan's Taleem Ghar, showed *limited adaptability* (average score 2). Analysis using the framework revealed strong intent toward accessibility but weak personalisation. For example, while both platforms provide language translation and text-to-speech, they lack cognitive-load adjustment or emotion-recognition modules, thus failing UDL Principle 3 ("multiple means of action and expression"). The gap between theoretical inclusivity and technical execution underscores challenges identified in RQ3 concerning implementation capacity and policy coherence.

South Asian countries—India, Pakistan, and Bangladesh—show rapid growth in EdTech, albeit under infrastructural constraints. Popular educational platforms including Byju's and LEAD together with Khan Academy versions that operate in specific regions serve large numbers of students (Das & Mondal, 2021). Atypical students learn through basic access and coverage solutions rather than developing customized educational content. The platforms serve students in general but fail to implement design features which accommodate neurodiverse learners (Rahman & Kapoor, 2023). The design phase of most South Asian EdTech systems lacks proper inclusion of neurodiversity features according to research. Tools tend to neglect basic accessibility tests that evaluate audio processing technology and feedback functions and executive control system features (Chowdhury & Ahmed, 2021).

Artificial Intelligence systems in the region primarily assist teaching staff through grading operations as well as analytics collection and content management but do not actively provide instant adaptive assistance to students (Irfan et al., 2023). The levels of training for teachers to utilize AI remain low while governments show little commitment to developing inclusive digital teaching practices (Kumar & Shah, 2024). Bangladesh and Pakistan face two major impediments which prevent students from accessing the internet due to high costs and limited network availability. The educational platforms Teachmint and EduBridge pursue access expansion across Pakistan but inclusivity stands behind their primary focus (Nayeem & Hasan, 2022).

Southeast Asia: Emerging Adaptability

The governments of Singapore and Malaysia serve as regional examples of AI education reforms that originate from public sector direction. The Ministry of Education (MOE) Singapore uses artificial intelligence to create diagnostic tools both for formative assessment and learning gap detection (Tan & Chee, 2021). Natural language processing technology within these systems demonstrates developing capabilities to adjust reading material complexities for neurodiverse students. The Malaysian government adopts AI implementation in educational environments through its Education Blueprint 2020–2025 by introducing technology which detects student behavior and emotional expressions (Mohd Yamin et al., 2023). The proper boundaries for ethical usage along with acceptance by diverse neurotypes remain unanswered when using analytics methods that monitor educational activities (Lim & Noor, 2023).

Ruangguru and Topica EdTech among other EdTech startups are experiencing rapid growth in Vietnam and Indonesia while they develop scalable digital learning solutions (Oxford Analytica, 2022). Their current direction is broad in scope but their inclusion features continue to be under development (Nguyen & Sari, 2022). Many educational platforms are implementing voice-controlled systems combined with gamification that demonstrate prospective ways for neurodiverse students to integrate into education. The implementation of neurodiverse-specific AI tools shows inconsistent results among regional countries including Singapore because it lacks proper policy measures despite their inclusion education requirements (Fong et al., 2024).

The third region, represented by Singapore's AI4Ed Programme and Malaysia's Frog VLE, displayed *moderate adaptability* (average score 3). Framework analysis indicated partial compliance with UDL Principles 1 and 2 but inconsistent alignment with Principle 3. These systems integrate speech-to-text and visual-support tools yet rarely include neurodiversity-specific modules such as attention-profiling or sensory filters. Findings corresponding to RQ4 show that while Southeast Asia has adopted AI in policy discourse, inclusion metrics remain emergent rather than embedded.

Comparative Synthesis Table

The Adaptability Rating Scale provided quantifiable evidence of each region's inclusivity level. Western tools averaged 4.5 (Highly Adaptable), Southeast Asian tools 3 (Moderately Adaptable), and South Asian tools 2 (Minimally Adaptable). These comparative ratings establish the analytic framework's effectiveness in translating qualitative observations into measurable inclusivity indices, directly answering RQ2–RQ4 and linking back to the study's central aim of operationalizing equity within AI-driven education.

Applying the Adaptability Rating Scale revealed that Western AI tools achieved an average score of 4.5 ("Highly adaptable"), characterized by NLP integration, multi-modal input, and predictive personalisation. Southeast Asian systems averaged 3 ("Moderately adaptable"), showing partial UDL compliance but inconsistent neurodiversity-specific customisation. South Asian tools scored 2 ("Minimally adaptable"), as inclusivity features remained limited to general accessibility settings without sensory or cognitive personalisation. These ratings provide measurable evidence linking the analytical framework with the data findings. Table 1. summarizes the comparative regional gaps in AI-based educational technology systems with a focus on neurodiverse learners.

Table 1. Comparative synthesis table

Region	AI Functionality	Customisation for Neurodiverse Learners	Policy Support	Teacher Training in AI	Leading Tools
Western	High (Diagnostic, Adaptive, Multimodal)	Strong – IEP Integration, NLP, Personalisation	Robust – Legal mandates (IDEA, etc.)	Frequent and Specialized	Lexia, ChatGPT-edu, Mindprint, AI Tutor
South Asia	Medium (Backend, Teacher-focused)	Weak – Minimal integration in tool design	Emerging but weakly enforced	Limited	Byju's, LEAD, Localized Khan Academy
Southeast Asia	Medium-High (Assessment, Monitoring)	Moderate – Singapore leads, others emerging	Moderate to strong in some countries	Developing	Ruangguru, Topica, MOE Diagnostic AI

Proposed Blueprint for Future Success

A multi-dimensional structure should direct future-ready educational AI system design which includes Southeast Asian neurodiverse learners as well as students from beyond this region. The strategic blueprint in this section demonstrates a comprehensive approach. This includes inclusive AI development; tool repairs for existing systems; dashboards for educator asset enhancement; and the establishment of comprehensive policy structures. The strategic blueprint draws from research about inclusive AI as well as cognitive psychology along with educational neuroscience and policy analysis during the period from 2020 to 2025.

Principles of Inclusive AI Design

Personalisation Beyond Learning Levels

The personalisation capabilities of AI should emphasize more than just knowledge mastery. Neurodiverse learners who have dyslexia, ADHD, and autism need specialized interventions that address their requirements regarding emotional control, cognitive workload, and executive brain operations (Gomez et al., 2023). The implementation of affective computing technology lets recent systems monitor emotional states which automatically modifies difficulty levels or interface structure during live interactions between users (Tan & Lee, 2022; Velazquez-Solis et al., 2025b). Adaptive storytelling platforms regulate language complexity through mechanisms that measure user engagement as well as stress markers along with comprehension markers (Zhang et al., 2024).

Flexibility in Input/Output Modalities

The feature of multimodal AI systems that permits student interaction by speech, text, touch, images or gestures makes these systems ideal for learners with speech or motor limitations. The research shows students gain better self-efficacy while their cognitive load decreases when they use their preferred input and output methods (Andersson & Hölzl, 2021). The combination of image processing together with audio processing in systems such as VoiceThread AI and Pictograph Assist helps non-verbal learners present their complex ideas (Rahim et al., 2022).

Attention-Awareness and Pacing Control

Physical sensors integrated into cameras and devices track student attention movements to detect losing focus. The system operates by suggesting either rest breaks or alternative pace changes. Attention-aware tutoring represents a concept which enhances focus for ADHD students and also functions as an adjustable approach for autistic learners who display sensitivity to screen time (Lim & Ong, 2023). The implementation of pacing controls which allow learners to control their content intake demonstrates effectiveness in enhancing working memory results (Yadav et al., 2022).

AI-Supported Metacognitive Scaffolding

The learning tools supported by AI now provide AI-based reflective questioning in conjunction with goal-setting capabilities and feedback loops that drive student learning awareness. The systems work best for students who have difficulties with executive functions (Vargas & Meyer, 2024). For example, AI prompts like "How confident are you about this answer?" or "Would you like to try another method?" The planning and evaluation approaches for neurodiverse students become possible through these stimuli.

Framework for Adaptation of Mainstream Tools

Add-On Modules

The sustainable method of tool enhancement relies on adapting current platforms like Google Classroom or Moodle to create neurodiverse support environments. The platform can accept plug-in functionality that includes emotion tagging and interface pacing controls and cognitive load indicators. Furthermore, NeuroScope and iFocusAI serve as proof of concept while demonstrating how new accessibility features maintain existing platform interfaces (Chen et al., 2021).

Data Masking for Anonymity

The identification of autistic learners results in social stigma and anxiety since they stand apart from others. AI systems need to implement privacy features from the start of development so learner profiles remain anonymous through data masking. Even though teachers need access to analytics but anonymity

is necessary. Advances in federated learning make possible personalisation that happens directly on devices while causing no identifiable data storage on servers (Singh et al., 2023).

NLP Tools for Speech and Language Processing

NLP algorithms are developing capabilities to process non-standard language patterns which include echolalia and fragmented syntax and nonlinear semantics that autistic or dyslexic students typically use. Neurodiverse discourse patterns applied to NLP models enable better comprehension checks and verbal scaffolds (Ali & Marquez, 2022). Inclusive AI voice assistants together with reading aids depend on these essential tools for their operation.

Integration of Behavior Analytics

The approach that learners take to solve problems becomes detectable through the use of behavior analytics by these systems. By linking dataset information with time-period data and response delay detection AI models produce behavioral profiles that identify learning problems ahead of official diagnoses (Yamashita et al., 2023). Through these analytics teachers obtain the ability to provide timely support which decreases the dropout rates of neurodiverse learners.

Teacher-Facing Dashboards

Custom Alerts

Teachers face challenges in recognizing minor signs of neurodiversity difficulties because class statistics are overwhelming. The use of AI dashboards enables the system to provide prompt notifications about particular student examples such as “Student X has registered cognitive fatigue throughout three prior sessions” and “Student Y experienced a 60% decline in their engagement.” The combination of longitudinal behavioral data analysis and sentiment evaluation allows these systems to provide teachers with useful insights instead of raw statistical information (Mendoza & Clarke, 2024).

Strategy Suggestions by AI

The platform should generate pedagogical recommendations in addition to its alert functions. The system provides ADHD students with recommendations for visual aids together with reading density reduction and additional interactive activities when their focus declines. Pattern recognition algorithms apply their training from neurodiverse datasets to generate these recommendations (Kwon et al., 2021). Evidence-based prompts provided to teachers minimize their instructional time while eliminating the need for uninformed decision making regarding individual student instruction.

Policy Recommendations for Southeast Asia

Incentives for Inclusive EdTech Startups

The governments of Southeast Asia must create financial support systems which provide tax advantages to EdTech businesses that develop neurodiverse learning technology solutions. General EdTech receives most of the existing investment funds while inclusive design solutions remain underfunded. The EduTech Catalyst Fund from Singapore functions as an example for governments to support inclusive innovation development (Chee & Low, 2023; Hackman & Reindl, 2022).

National Standards on Neurodiverse AI Learning Tools

The development of an organized structure providing definitions for a "neurodiversity-inclusive AI system" remains vital. The national standards system must specify rules for accessibility features alongside guidelines about data ethics and customisation options and performance metrics which pertain to neurodiverse users. The implementation of standards will help procurement decisions while driving industry alignment (Tan & Nurhaliza, 2024).

Training Programs for Teachers on AI Inclusivity

Teacher readiness functions as a major obstacle for implementing programs successfully. National training modules should address:

- Basics of AI and its educational applications
- Understanding neurodiverse needs
- Teachers need training in AI dashboard functions and feedback systems.
- Ethical considerations in student data usage

Brief training that targets specific content allows teachers to enhance their abilities when using AI technology. This training produces improvements between 40% and 60% in teacher proficiency (Liew et al., 2021). All training modules need to be essential components which build up in difficulty and need to be accessible in local languages.

Conclusion

This study demonstrates that the integration of Artificial Intelligence (AI) in education varies significantly across regions in terms of inclusivity for neurodiverse learners. Western countries exhibit *high adaptability* through advanced personalisation, multimodal input, and integration within Individualized Education Programs (IEPs), supported by strong infrastructure and policy frameworks. In contrast, South Asia, despite rapid EdTech growth, remains *minimally adaptable* due to infrastructural constraints, limited teacher training, and lack of neurodiversity-focused design.

Southeast Asia occupies a *moderate position*, with emerging adaptability driven by government-led reforms but hindered by inconsistent policy execution and ethical uncertainties.

The comparative analysis validated the usefulness of the integrated analytic framework, combining Universal Design for Learning (UDL), AI Functionality Typology, and the Adaptability Rating Scale, in quantifying inclusivity. The framework effectively translated qualitative insights into measurable outcomes, highlighting the need for systematic AI inclusion policies.

The proposed blueprint emphasizes future directions: inclusive AI design centered on personalisation, multimodal flexibility, and metacognitive scaffolding; adaptation of mainstream tools through add-on modules and anonymized data systems; and teacher-facing dashboards that transform data into actionable strategies. At the policy level, Southeast Asian governments should incentivize inclusive EdTech innovation, standardize neurodiversity guidelines, and strengthen teacher training. Overall, the study concludes that true inclusivity in AI-driven education requires moving beyond accessibility toward adaptive, ethically governed systems that recognize and respond to the diverse cognitive and emotional needs of all learners.

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