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Reimagining Inclusive Higher Education for Autistic Students: Conceptual and Preliminary Empirical Insights toward Realizing SDG4 in Malaysia

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ABSTRACT

The increasing enrolment of students with Autism Spectrum Disorder (ASD) in Malaysian higher education institutions reflects promising progress toward a more competitive and inclusive academic access. However, existing pedagogical approaches, assessment methods, and institutional frameworks in Malaysian higher education continue to cater predominantly to the needs of neurotypical students, often failing to address the unique cognitive, emotional, and social needs of neurodivergent learners. This study seeks to explore the challenges faced by autistic students, particularly those enrolled in technology-based diploma programmes. Moving beyond a purely conceptual reflection, this study incorporates a preliminary analysis of academic performance trajectories of ASD students within a computer science programme in a Malaysian university. Initial findings reveal a distinctive pattern: high foundational cognitive performance with students achieving Grade A+ in core technical subjects and initial GPAs as high as 3.69, followed by a consistent longitudinal decline in CGPA as the curriculum complexity increases. These observations underscore the urgent need for transformative educational models to sustain academic momentum. Through a detailed review and reflection, this discussion highlights the Universal Design for Learning (UDL) framework as a strategic mechanism to improve institutional flexibility, accessibility, and engagement. Ultimately, this study aims to advance Malaysia's discourse on inclusive education and support national and global efforts to realise SDG 4: quality education for all.

1. Introduction

Efforts toward inclusive higher education have garnered increasing global attention, in alignment with United Nations Sustainable Development Goal 4 (SDG 4), which advocates for quality, equitable, inclusive, and accessible education for all [4,11]. In Malaysia, the rising enrolment of students

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diagnosed with Autism Spectrum Disorder (ASD) in higher education institutions has demonstrated encouraging progress in expanding educational access to neurodivergent learners [7,10]. This development reflects broader alignment with the national educational philosophy, which emphasizes holistic and integrated individual development, as well as growing institutional awareness of the needs of ASD students. However, the implementation of inclusive education in higher education largely remains grounded in frameworks and pedagogical models designed for neurotypical learners, resulting in evident gaps between curricular structures and pedagogical practices that hinder the full participation and academic success of ASD students [3,9]. When viewed within the context of Malaysia's higher education landscape, this phenomenon stands in stark contrast to the objectives espoused by the national educational philosophy.

ASD is a complex neurodevelopmental condition marked by differences in social communication, restricted or repetitive behaviors, and unique sensory and cognitive processing patterns [1]. Although these characteristics vary widely among individuals, they can significantly affect how ASD students engage with academic structures, interact with peers and lecturers, and adapt to the demands of higher education [7]. For students enrolled in technology-based diploma programs such as computer science, engineering technology, and similar fields, these challenges may be further exacerbated by intensive technical curricula, assessment formats primarily designed for neurotypical learners, and a lack of tailored learning support for ASD individuals [12]. As a result, such students often experience heightened academic stress, lower retention rates, and limited prospects for graduation and employability within industry [2]. To address these concerns, this study explores the Universal Design for Learning (UDL) framework as a fitting, inclusive approach for ASD learners. UDL emphasizes flexibility in teaching, learning, and assessment by offering multiple means of engagement, representation, and action/expression [5]. While UDL principles have seen growing adoption in various educational contexts around the world, their integration into Malaysian higher education especially within the context of neurodiversity, remains limited and underexplored [9]. This conceptual study aims to bridge this gap by discussing the systemic challenges faced by ASD students in Malaysian higher education institutions, synthesizing relevant literature, and observing current institutional practices to propose a more inclusive and sustainable educational model tailored to ASD learners. By situating the discussion within the broader agenda of SDG 4, this conceptual reflection underscores the urgent need for transformative pedagogical and institutional reforms. The proposed framework seeks not only to enhance the learning experiences and academic outcomes of ASD students but also to contribute to Malaysia's efforts in building a socially equitable and globally competitive education system, aligned with the national educational philosophy.

1.1 Autism Spectrum Disorder (ASD) Students in Higher Education

ASD students in higher education represent a diverse population with unique cognitive, social, and communication profiles. ASD is characterised by persistent differences in social interaction, verbal and non-verbal communication, and restricted interests, which present uniquely in each individual [1]. In the context of higher education, these students often face challenges such as sensory sensitivities, social isolation, and difficulties with executive functioning and unstructured learning environments [2]. Despite these challenges, ASD students often possess distinct strengths, including attention to detail, strong memory skills, and a preference for visual or routine-based learning environments. These strengths, when supported appropriately, can contribute meaningfully to academic success. Furthermore, inclusive teaching methods that incorporate structure, visual aids, and clear expectations are particularly beneficial for autistic learners. However, many higher

education institutions, especially in developing contexts like Malaysia, remain underprepared to meet the needs of ASD students due to limited staff training and rigid pedagogical practices.

1.2 Inclusive Higher Education for Autism Spectrum Disorder (ASD) Students

Inclusive higher education for students with ASD requires reconsidering pedagogical and institutional structures to accommodate ASD learning needs. A central model guiding this shift is Universal Design for Learning (UDL), which emphasizes removing barriers through three core components which are means of engagement, representation, and action/expression [5]. For ASD students who often experience sensory sensitivities and social anxiety, offering varied ways to engage such as quiet workspaces, self-paced tasks, or interest-based learning will enhance motivation and reduce cognitive overload. In terms of representation, UDL supports the use of diverse instructional materials like visual aids, videos, written transcripts, and simplified instructions which align with ASD learners' strengths in visual processing and structured thinking. Finally, multiple means of action and expression allow ASD students to demonstrate understanding in ways that suit their communication style, whether through written reports, video submissions, or project-based work. However, while UDL principles are widely endorsed, their implementation across higher education remains inconsistent. Many universities still rely on traditional, rigid teaching and assessment models, limiting accessibility. Embedding UDL at the institutional level is believed to offer a transformative path toward genuine inclusion for ASD students, enabling them to thrive academically and socially.

1.3 Sustainable Development Goal 4 Relevance for Autism Spectrum Disorder (ASD) Students in Higher Education Malaysian Landscape

Sustainable Development Goal 4 (SDG 4) emphasizes inclusive and equitable quality education for all, with specific attention to learners with disabilities. For students with ASD, this global commitment must translate into meaningful institutional change. In Malaysia, while national policies such as the Persons with Disabilities Act 2008 promote inclusive education, their application within higher education remains inconsistent and often symbolic [9]. ASD students in higher education institutions frequently encounter systemic barriers like rigid curricula, limited faculty training, and a lack of autism-informed support services which hinder participation, progression, and academic success. Mapping SDG 4 to the Malaysian context requires higher education institutions to not only expand access but also reimagine pedagogy and infrastructure through frameworks like UDL. UDL offers a practical pathway to inclusion by accommodating diverse learning needs via multiple modes of engagement, representation, and expression. Embedding these approaches at the policy and practice levels aligns with Malaysia's national education aspirations and global obligations. Ultimately, achieving SDG 4 for ASD learners demands that inclusion be institutionalized not merely through access, but through pedagogical transformation that affirms ASD as an educational asset.

2. Methodology

This study is grounded in Universal Design for Learning (UDL) as a proactive, principles-driven approach to addressing learner variability in higher education. The primary objective of UDL is to provide equal opportunities for all students, regardless of their abilities and learning styles, by offering a flexible and accessible curriculum design. In UDL, the important principles rely on the multiple means of representation of content, engagement methods through learning materials and

activities, and the opportunities given to students to express the knowledge gained using multiple means of expression [8]. With multiple means of representation, engagement, and expression, it may reduce barriers to cater learning needs of ASD learners. This may ensure that the teaching, learning, and assessment conducted are accessible and conducive. This paper proposes a conceptual model for ASD learners that refers to UDL as the fundamental approach, with the extension of three branches: social skill development, technology tools, and institutional support, as shown in Figure 1 below.

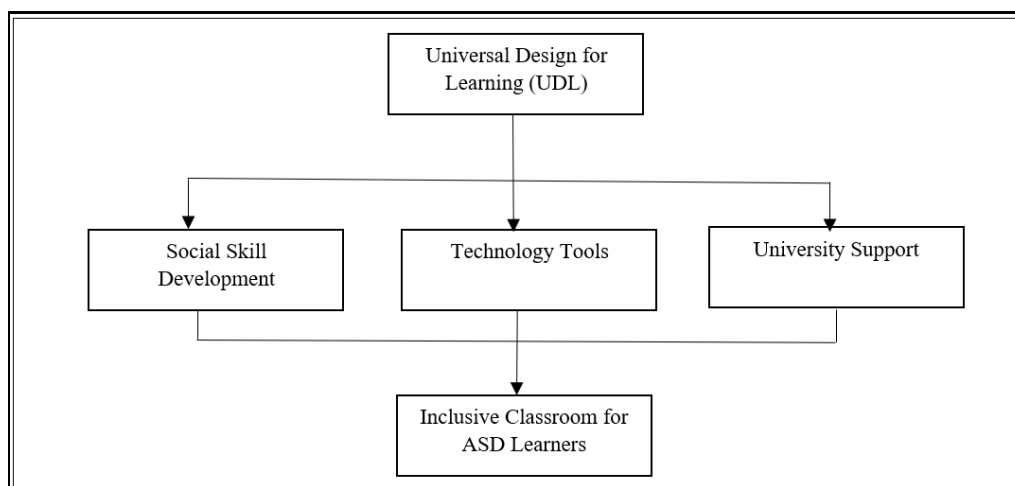


Fig. 1. The proposed hypothesis for ASD learners within Universal Design for Learning (UDL) framework

2.1 Social Skills Development

The proposed hypothesis statement related to social skill development is H1: The application of UDL-informed pedagogical design in technology-based diploma programs will be positively associated with improved academic engagement among students with ASD. In practice, ASD learners often face difficulties in dealing with social interaction, exploring new and unstructured environments, and adapting to new routines within higher learning institution settings. Thus, having social support in this model may improve adaptability and academic success by reducing anxiety and enhancing a sense of belonging to the new environment. Structured orientation programs involving ASD professional trainers, sensory-friendly campus tours, and peer mentoring sessions enable ASD learners to navigate academic and social environments with more confidence. Ongoing social skills workshops and inclusive events promote belonging and reduce isolation. On-campus activities such as introductory workshops on study skills, self-advocacy, and group collaboration prepare the ASD learners for university life. Multiple means of representation, engagement, and expression contributed to this component by purposely motivating learners to perceive and respond to learning activities [6]. The social engagement of ASD students must be given due attention by educators and university communities by encouraging more programs and activities that involve this group of learners. This approach can, to some extent, enhance the social skills of ASD students, particularly at the university level. In the context of classroom learning and assessment, targeted teaching strategies and more direct and diversified forms of assessment are highly encouraged. Such practices will help build greater confidence among ASD students in achieving the intended learning outcomes, in line with their abilities especially when mastering specific courses that involve technological and technical content. The two factors mentioned, social skill development and engagement, are crucial to ensuring that ASD students become more open, socially adaptable through structured activities, and

more receptive to the teaching and assessment methods implemented, similar to those used with neurotypical students. This can further support their academic and non-academic development.

Therefore, hypothesis H1 statement is well-justified in this context and should be further explored through continued discussion to identify effective approaches and mechanisms tailored to the needs of ASD students, particularly within higher education institutions.

2.2 Technology Tools

The proposed hypothesis statement related to technology tools is H2: UDL-informed assessment strategies will reduce performance disparities between students with ASD and their neurotypical peers. UDL principles offer multiple means for representation, which should benefit all students, including ASD learners. However, significant barriers to disabled participation remain present with insufficient support for sensory and social needs. Therefore, it is time for people involved in UDL to return to universal design with a proper investment plan in building the environment with suitable technology and tools for disabled and neurodivergent students. To offer multiple means for engagement, technologies to create interactive elements, simulations, or gamified content should be explored and embedded to allow ASD learners to participate and succeed in their educational journey. Due to that, the diversity of assessment in university education, particularly for ASD students, must be distinguished from that applied to neurotypical students. The perception held by some educators that both groups should be assessed equally is fundamentally flawed. This contrasts with the core principle of Universal Design for Learning (UDL), specifically the principle of multiple means of action and expression, which calls for the implementation of varied and alternative forms of assessment tailored to the needs of these learners.

To illustrate, consider an educator assigning a swimming test to a group of students that includes a fish, a monkey, and an ant. Naturally, the fish would find the task easy, being in its natural environment, but this is not the case for the monkey and the ant. Therefore, educators must consider alternative forms of assessment that provide fair opportunities for all participants. This analogy emphasizes the need for thoughtful, differentiated assessment strategies that are aligned with students' individual abilities. This approach inevitably requires additional effort and planning from instructors. Even with accommodations such as extended time, such adjustments may still fall short in adequately capturing the abilities and understanding of ASD students in relation to the learning outcomes of a given course. As such, alternative assessments such as digital portfolios, simulations, practical projects, or other suitable methods should be designed in a way that aligns with the specific capabilities of ASD learners. While these may differ from those used with neurotypical students, the structure and implementation should still reflect the intended learning outcomes. In this regard, hypothesis H2 statement is particularly relevant, as it addresses the importance of reducing performance disparities between ASD students and their neurotypical peers through differentiated, ability-sensitive assessment. Further research could explore the effectiveness, mechanisms, and pedagogical approaches linked to this hypothesis, supported by empirical data and methodologies that may serve to enhance teaching and learning practices in the future.

2.3 Institutional Support

The proposed hypothesis statement related to university support is H3: Institutions that systematically implement UDL principles will report higher perceived inclusivity and learner satisfaction among neurodivergent student populations. The university plays a significant role in providing a coordinated effort to support ASD learners, such as the facilities that consider inclusive

access. If they are not currently established, a unit should be created to support ASD learners by leveraging existing university resources, such as disability services, academic advisement, counseling, and residence life, thus will improve ASD learners' university experiences. Establishing person-centered planning, engaging faculty on inclusive best practices, and embedding support for social-emotional learning are steps that could be carried out by the university to incorporate the UDL principles in university settings [4]. University infrastructure and academic program design are key factors in determining the success of both students and the programs developed by an institution. This is especially critical for programs that are technology oriented. While existing educational facilities may be adequate to support the majority of students, it is essential to ensure that these facilities are also inclusive and holistic enough to meet the unique needs of ASD students.

Therefore, a comfortable and accessible learning environment plays a vital role in supporting their learning process throughout their time on campus. In addition, continuous support from academic staff is crucial particularly academic advisors and lecturers directly involved in the students' progress. These individuals must be committed to supporting the learning outcomes and assessment processes that affect ASD students. As previously discussed, the active involvement of advisors and teaching staff is indispensable, and therefore, mechanisms to strengthen their roles in supporting ASD learners should be taken seriously by university management. Accordingly, Hypothesis 3 (H3) plays a significant role in ensuring that ASD students can effectively adapt to the academic and social demands of the university environment. A well-coordinated institutional support system not only helps these students navigate university life but also contributes to building stronger self-identity, broadening personal development, and enhancing their overall learning experience on par with their neurotypical peers.

Although these are conceptually based hypotheses, they also presuppose a practical dimension: a measure of educational quality will be a determinant of inclusive design, although it is not a moral mandate. This proposed conceptual model as shown in Figure 2 where each institution mechanism (social skills development, technology tools, institutional support) addresses all three UDL principles multiple means of engagement, action & expression, and representation to support progress toward Sustainable Development Goal 4 (SDG4).

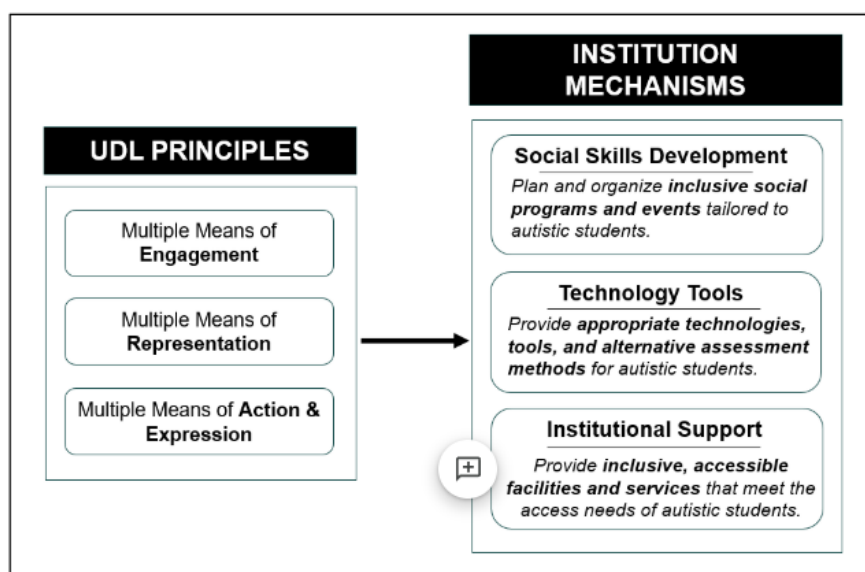


Fig. 2. The conceptual model: UDL implementation mechanisms for ASD inclusion In Malaysian Higher Education

3. Results

The literature review and hypothesis conclude that there exists an underlying tension between the rising number of students with ASD enrolling in higher education in Malaysia and the rigidity of learners-based instructional models, which are not very accommodative to the learners with ASD. Although this movement is an indicator of progressive movement towards inclusiveness, it also reveals the shortcomings of the current pedagogical and institutional frameworks.

The traditional lecture-like teaching mode, severe format of the tests and evaluations, and lack of any variation in the engagement method do not consider the cognitive, sensory, and social-communicative diversity of the student population. In the case of students enrolled in technology-based diploma programmes, where curricula can become dense, fast-paced and highly-skill driven, such weaknesses can translate into increased academic anxiety, less self-efficacy and attrition vulnerability.

To contextualize this conceptual reflection with empirical observation, a preliminary analysis of the academic trajectories of ASD students enrolled in the Diploma in Computer Science (CDCS110) at Universiti Teknologi MARA (UiTM) Pahang, Raub Campus, reveals a compelling narrative. Initial semester results indicate strong foundational and cognitive capabilities, with students achieving a Grade Point Average (GPA) as high as 3.69 and securing top academic grades (A+) in core technical courses such as Introduction to Algorithm Design and Development.

This aligns with the literature highlighting the distinct strengths of autistic learners, particularly in visual, logical, or rule-based processing environments. However, a longitudinal view of their cumulative grade point average (CGPA) exposes a concerning downward trend across subsequent semesters. Observations of multiple ASD student records consistently show a gradual decline in CGPA as they progress to higher parts of the program; for instance, distinct student trajectories demonstrate declines from 3.69 to 3.58 , 3.33 to 3.01 , and more drastically from 2.92 dropping to 2.26. This pattern empirically underscores the argument that as the curriculum becomes denser, faster-paced, and more highly skill-driven, the existing rigid pedagogical and assessment frameworks fail to sustain their initial academic momentum. This longitudinal decline in academic performance is visually illustrated in Figure 3 below. It provides practical evidence supporting Hypothesis 2 (H2), emphasizing that without UDL-informed assessment strategies and structured institutional support, performance disparities will widen due to systemic environmental barriers rather than any deficit in the students' innate cognitive abilities.

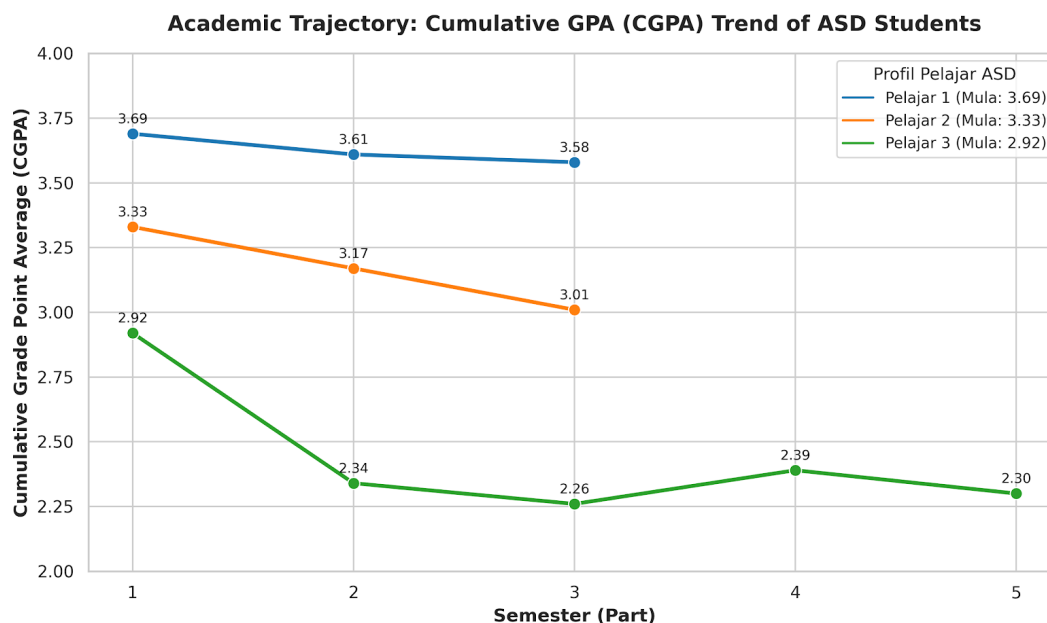


Fig. 3. Trajectory of Cumulative Grade Point Average (CGPA) among ASD learners enrolled in the Diploma in Computer Science across multiple semesters

Viewing the analysis of current practices through the lens of Universal Design for Learning (UDL) makes it clear that the flexibility, multi-mode representation and scaffolded support are not present to ensure equitable participation in many of the current practices. Important though they are, the recent establishment of disability support units in some universities (and ad hoc accommodations), remain reactive rather than embedded in course design. As an example, U-DServeD (UiTM Disability Services and Development Division) is the main center of support of ASDs at Universiti Teknologi MARA.

Its activities focus on promoting inclusive, disability-friendly environment, and ensuring equal access to education and life on campus. It offers all the services including academic accommodations, career guidance, training and upskilling programs, occupational, and speech therapy, and emotional and psychosocial support. Besides that, U-DServeD oversees financial aid projects such as BKWO-UiTM, BKOKU, and UiTM Endowment Scholarship on ASD students, and research, innovation and social entrepreneurship, e.g. Disability Invention, Design and Innovation (DIDI) Awards. Driven by its vision to be a leading centre of empowerment in the Malaysian higher education, U-DServeD will focus on promoting the advancement, progression and welfare of the ASD community at UiTM.

Table 1 below illustrates additional examples of support services available for Persons with Disabilities (PWD), particularly for students with Autism Spectrum Disorder (ASD), at selected Malaysian universities.

Table 1

Examples of PWD support centers at Malaysian Universities

University	Support Structure / Program	Key Services
UTM	Disability Support Unit (JTNCHEP)	Mobility aids, financial aid, access, OKU-friendly housing
Taylor's University	Centre for Counselling Services (CCS)	Learning accommodations, exam adjustments, accessible facilities
Monash University Malaysia	Disability Services	Alternative assessments, MOHE financial support

Universiti Teknologi PETRONAS (UTP)	Disability Support	Infrastructure access and onboard facilities
UKM	UPS-OKU (Unit PWD Support)	Academic support, liaising, scholarships, inclusive programs
University of Reading Malaysia (UoRM)	Disability Office	Reasonable study-related adjustments
UMP (UMPSA)	Disability Services Unit (OkUMP)	Assistive tech, adaptive labs/dorms, accommodations
University of Malaya (UM)	UMCares' "Be Able" program	Assistive-device education, sports, rehabilitation

Given that infrastructure, inclusive practices, and policy need to be combined to make academic and workplace environments accommodating and accessible to ASDs, the entity must be comprehensive in its approach. These consist of ensuring accessibility of facilities through ramps, elevators, priority parking spaces, and adaptive restrooms; using universal design in learning (UDL) through offering resources in multiple forms, sign-language interpretation and assistive technologies; and modifications in the workplace setting such as flexible schedules, adaptive equipment and transparent grievance procedure or mechanisms.

Just as essential are financial support programs, available career counselling services, counselling and peer mentoring to reinforce emotional strength and employability. Disability awareness activities, staff and peer training as well as effective governance where the PWD are part of decision-making through dedicated support units have helped institutionalize inclusions. Aligning physical accessibility, inclusive teaching and working practices, favourable policies and progressive technologies can transform institutions of higher learning into places of empowering learners so that ASDs can enjoy equality and flourish.

4. Conclusions

The increased number of students with ASD in higher education in Malaysia is evidencing the improvement in increasing access to education, but it also highlights the shortcomings of current pedagogical and institutional practices that predominantly focus on neuro-normative learners. This paper has demonstrated through both conceptual reflection and preliminary empirical analysis of academic trajectories that systemic change is urgently necessary. Specifically, transitioning toward a Universal Design for Learning (UDL) framework that focuses on flexible, accessible, and engaging practices is essential to better accommodate the diverse cognitive, emotional, and social needs of autistic students. When pinpointing technology-based diploma programs, the observed longitudinal decline in students' CGPA underscores the severe impediments that arise without active curriculum and assessment redesign, despite the students' strong initial cognitive capabilities. Placing the argument in the context of both national priorities and the call to global action by Sustainable Development Goal 4 (SDG4), the paper advocates that structural and proactive inclusivity must be embedded within the institution, rather than relying on reactive or ad hoc accommodations. Lastly, recognizing and embracing the inextricable nature of neurodiversity in universities life is the key to sustainable gains, as it makes higher education a more profound and equitable experience for everyone.

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