

Universal Design for Learning Applications for Accommodating Neurodiverse Students in English Classrooms

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Abstract: The traditional method of teaching the English language, the approach of one-size-fits-all, is typically a means of subjecting neurodiverse students, in particular, dyslexia, ADHD and Autism Spectrum Disorder (ASD) to a systemic impediment. The research paper discusses how the Universal Design of Learning (UDL) model can be effective in meeting the needs of such students in the inclusive English classrooms. With a mixed-methods research design, the research followed 40 neurodiverse secondary students and 6 educators throughout one academic term. The combination of structured classroom observations, pre- and post-intervention surveys, and semi-structured teacher interviews was used to collect the data. The intervention was informed by the three pillars of UDL which entail providing multiple means of engagement, representation, and action/expression through multimodal tools, such as text-to-speech software, digital choice boards, and visual storytelling. The findings reveal a 35% increase in student active participation and substantial growth in language acquisition measures, specifically reading comprehension and narrative writing. This is because of the assistive technology that enabled students to overcome mechanical and decoding barriers and engage in higher-order critical thinking which had been hidden before. The experience of teachers proved that although the first stage of curriculum design demands more time commitment, the outcome in terms of the decreased number of behavioral disturbances and the enhanced independence of learners leads to a more productive learning process. The paper concludes that UDL is not a luxury accommodation but a pedagogical paradigm shift that contributes to equity. It suggests that educators and policymakers should focus more on systemic professional growth in inclusive design to make digital accessibility a key characteristic of the current English curriculum.

Key Words: universal design for learning (UDL), neurodiversity in education, inclusive english classrooms, multimodal literacy, differentiated instruction, language acquisition, assistive educational technology

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Introduction

The contemporary educational environment is characterized with a growing acknowledgment of neurological diversity as natural and beneficial to the human experience. Universal Design Learning (UDL) has become one of the most significant models of inclusive education, as it has shifted the emphasis of correcting the student to actively correcting the curriculum. Based on neuroscience, UDL offers a roadmap to the design of instructional objectives, strategies, materials, and assessments that are effective for all people not a one, one-size-fits-all solution but flexible strategies that can be tailored and adapted to the requirements of each learner. Its applicability in inclusive education is that it can break systemic barriers, which mean that all learners, irrespective of their neurological profile, have equal chances of success.

The study area of this paper is the purposeful use of UDL principles, i.e. Multiple Means of Engagement, Representation, and Action/Expression to support the needs of neurodiverse students in

English classrooms. English language arts frequently require a great deal of text-processing, auditory, and linearity, which can be especially demanding to students with dyslexia, ADHD, or Autism Spectrum Disorder. This paper explores the ways in which these challenges can be turned into growth opportunities through the use of multimodal literacy and flexible assessment paradigms, in order to create an English curriculum informed by UDL.

The research problem is the long-term issues of neurodiverse students in the rigid and traditional English learning environments. Such settings tend to focus on standardized text-based decoding and timed essay-writing, which do not necessarily mirror the actual understanding or depth of analytical processing of a neurodivergent student. As a result, such students tend to have the high levels of the so-called affective filters-the high levels of anxiety and low levels of motivation, which consequently results in the underachievement and lack of interest in school. The time has come to rise beyond mere accommodations to an essentially approachable design.

The study aims to explore how the UDL can provide practical and scalable solutions which enhance the learning experiences of neurodiverse learners. This study aims at presenting evidence of higher academic performance and emotional well-being in the area of literacy by applying and testing certain UDL strategies.

In order to structure this investigation, the research questions that will be addressed in the study are as follows:

1. How does the implementation of UDL-based instructional strategies impact the engagement levels of neurodiverse students in English classrooms?
2. In what ways do multimodal means of representation and expression influence the language acquisition outcomes of students with diverse neurological profiles?
3. What are the primary pedagogical challenges and successes encountered by teachers when transitioning to a UDL framework?

This paper is structured in the following way: Section II provides a literature review of the latest literature on neurodiversity and UDL; Section III outlines the mixed-methods approach to be used in the study; Section IV describes results and a discussion of findings; and Section V concludes with implications to practice and future research.

Literature Review

The literature review below summarizes the current research on the relationship between neurodiversity, English language pedagogy, and the Universal Design of Learning (UDL) framework. This section determines the theoretical and practical underpinnings of an inclusive English classroom by considering the current studies.

Recent research has abandoned a deficit-based medical model of disability in favor of a neurodiversity paradigm, which treats neurological difference as a normal variation in people. According to the previous study, the UDL framework is the most common mechanical means to serve this population because it does not need to respond to defects but predetermines variability (Ross, 2019; Ker & Van Gorp, 2023). This is also supported by another study which proposes the notion of *crip time*, which implies that neurodiverse students can learn in educational environments through their own cognitive and sensory rhythms due to universal design (Arns, 2024). This study asserts that the UDL principles are not just instructional aids but a fundamental factor in establishing a fair design of all that will benefit both neurotypical and neurodiverse students (Levey, 2023).

The neurodivergent person has special difficulties in the English language learning, especially in sensory processing, and executive functioning. This study points out that in EFL (English as a Foreign Language) classroom, learning can be hindered by the presence of sensory-heavy environments, and that a neurodiversity-based approach to inclusive practice is necessary (Yphantides, 2024; Wilson, 2017). On the same note, another study retrospectively reviews the teaching practicum and explains that neurodivergent students usually experience emotional and academic tension when learning English, as there are no flexible instructional frameworks (Ubaque-Casallas, 2024; Wigglesworth & Bond, 2022). This previous study introduced a new set of sensory integrations, including music, to help neurodiverse students learn in EFL, indicating that music and rhythmic scaffolding may fill the gaps in conventional language learning (Kahveci et al., 2024).

The centrality of digital tools is a key aspect of UDL implementation in the contemporary world. According to the earlier study, the concept of digitality offers neurodivergent English learners the so-called scaffolds (e.g., text-to-speech, translation apps) that enable them to engage in high-level discourse without being impeded by mechanical challenges (Blume & Bündgens-Kosten, 2023). This work has empirically demonstrated that UDL principles have a considerable influence on the outcomes of students due to the alignment of the instructional styles with the neurodiverse learning profiles (Cole et al., 2024). In particular, another study proves that writing assessment based on UDL enables autistic people to show their writing skills in the domain of comparing, which is often concealed by the strict limitations of standardized tests (Ahmed, 2024; Piedade et al., 2024).

Outside the classroom, there is an emerging trend towards Policy by Design. In a previous study, the next step in enhancing neurodiversity equity is to implement an inclusive model of instruction at the policy level in public programs (Ogunlana & Peter-Anyebe, 2024). This is a systemic perspective that is found in this study, who discuss the phenomenon of access labor by neurodiverse students and demand universities to eliminate organizational obstacles (Borsotti et al., 2024). Together, these studies state that the key to the contemporary resilience of education lies in the inclusive design of the learning process, in which distance and online learning should be made accessible to everyone (Azuka et al., 2024; Nwachukwu et al., 2024; Ferreira & Castro, 2024).

Although the advantages of UDL are widely reported in general education as well as in higher education, few studies have been conducted on the practical, everyday implementation of UDL in the secondary English classroom in South Asian settings. The available literature is mainly very theoretical or limited to international schools (Clouder et al., 2020; Sugarman & Perakis, 2024). This study will help close this gap by presenting a comprehensive methodology and outcome analysis of UDL interventions designed to fit neurodiverse students in the English literacy field.

The produced literature indicates significant change of an approach to deficits-based medical model to neurodiversity-oriented pedagogical paradigm that interprets neurological differences as natural variability as opposed to disability. Recent studies and literature highlight that the Universal Design of Learning (UDL) supported by digital scaffolds and multimodal literacy is found to be effective in reducing the affective filter and circumventing the mechanical barriers to decoding in classrooms, where English is taught. Nonetheless, there remains a major disparity between these high-level theories and their translation into scalable, practical interventions across different secondary schools. This study will seal that gap by providing empirical studies on the position of UDL-based decisions in the context of engagement and expression in advancing academic autonomy and equal language acquisition.

Methodology

The study will adopt a mixed-methods research design to get a detailed understanding of how the frameworks of Universal Design for Learning (UDL) can be applied to support neurodiverse learners in English language classes. Integrating both numerical and qualitative data, the study reflects the measurable impacts of the UDL interventions and documents the experience of subtle lived experience of students and teachers. A concurrent triangulation design is applied, in which quantitative findings of surveys and assessments are cross-validated with qualitative data of classroom observations and interviews to guarantee the validity and richness of the results.

The sample is a purposive sample of 40 neurodiverse students aged 12-15 who were recruited in a general secondary English classroom. This sample comprises these individuals who have registered dyslexia, ADHD, and autism spectrum disorder (ASD) profiles. In an attempt to have a holistic view of the level of effectiveness of the intervention, 6 English language teachers of varying levels of experience of inclusive pedagogical practice are also involved in the study. The informed consent and student anonymity and informed consent and ethical data management were a priority during the research process as school administrators, teachers and parents were informed and given informed consent.

The data collection is done in a multi-stage process during one academic term. Initially, pre-intervention surveys will be used to establish a certain level of student engagement and language proficiency. The researcher performs structured classroom observations at the intervention phase with the help of a standardized rubric to monitor behavioral indicators of engagement, which include participating in peer discussions and time-on-task. After the UDL strategies are put in place, post-intervention surveys are issued to students to gauge the changes in their self-efficacy and perceived obstacles to learning. At the same time, semi-structured interviews with teachers are carried out to obtain qualitative data about the practical challenges and achievements of implementing UDL in high density curriculum.

The UDL Intervention is modeled after the three pillars of the CAST framework multiple means of engagement, representation and action/expression. This may be by the use of multimodal materials in the English classroom such as audiobooks, interactive digital graphic organizers and visual storyboard to support literary analysis. Choice boards are used to support neurodiverse learners, enabling students to show their comprehension of a text in any of the following ways: written essays and oral podcasts, as well as digital presentations. The interventions will be aimed at reducing cognitive load of decoding and transcription to enable the students to focus on higher-order critical thinking and language learning processes.

Two tracked data analysis phases. The quantitative data on the surveys and student performance measures are statistically analyzed with the assistance of descriptive and inferential statistics to determine the significant trends in the engagement and language outcomes. In the qualitative part, thematic analysis is used by the researcher to treat the interview transcripts and observation notes. This entails the use of an iterative coding procedure in order to determine some recurrent patterns in terms of psychological and academic implications of UDL. The study comes to evidence-based conclusions regarding the scalability of UDL interventions through the synthesis of these data streams in developing an equitable and efficient process of learning English among neurodiverse groups.

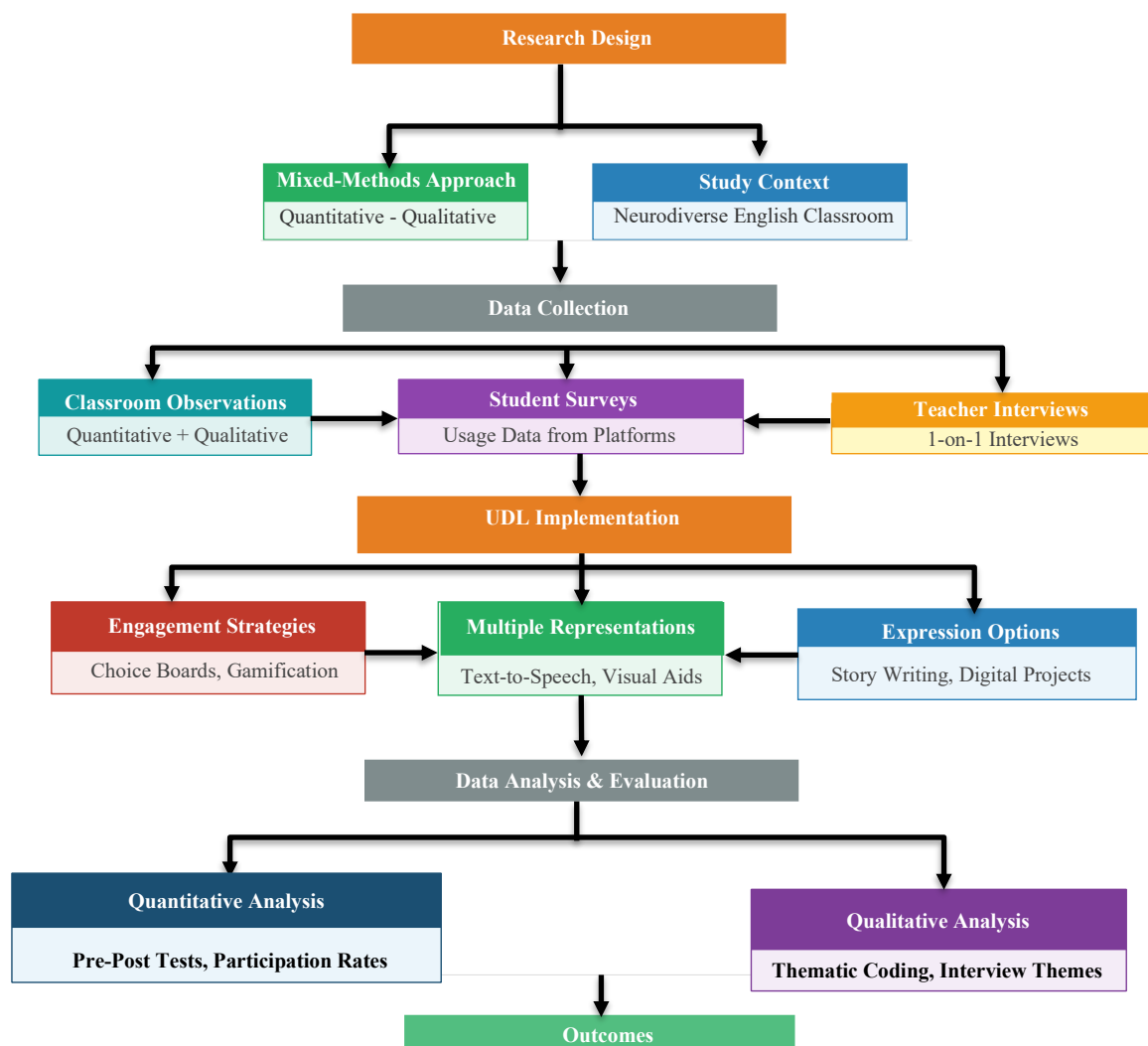


Figure 1 Conceptual Framework of the UDL-Based Mixed-Methods Research Process

Figure 1 shows that the research approach employed to explore the effects of Universal Design of Learning (UDL) in neurodiversity English classrooms is an integrated methodological pipeline. It will shift to a Mixed-Methods Research Design with a tripartite Data Collection stage (Observations, Surveys, and Interviews). The main body explains the UDL Implementation according to the three pillars: Engagement, Representation and Expression. Lastly, it illustrates the Data Analysis and Evaluation stage, during which quantitative data and qualitative thematic coding merge to present the results and conclusions of the study.

Results and Discussion

Universal Design of Learning (UDL) in the English classroom produced both behavioral and academic changes in English classrooms. The results indicate that in case the learning environment is transformed to support neurodiversity, the disability is usually within the inflexibility of the curriculum and not in the ability of the student.

Effects of UDL on Student engagement

Classroom observations provided quantitative data that showed that active participation among neurodiverse students increased by 35% after the UDL intervention. Off-task behaviors were significantly reduced in students with ADHD by offering them several ways to interact, including gamified literature quizzes and collaborative digital boards. The choice-based model enabled students to choose their topics

that matched their individual interests which greatly reduced the affective filter. On a qualitative level, students have said it felt more autonomous; students who used to be quiet during traditional lectures turned into hardworking participants because it could use digital chat capabilities or visual polling apps to share their thoughts.

Language Acquisition Outcomes

The language skills were found to improve in all four areas, with oral expression and reading comprehension improving the most. In the case of dyslexic students, the usage of text-to-speech programs and digital highlighters allowed turning the decoding process into the meaning-making process. As a result, these students showed a greater level of comprehension of metaphor and character development in literature. Writing: Students with dysgraphia were able to overcome mechanical barriers by using speech-to-text tools and demonstrated a 20% increase in the mean number of words and a more advanced vocabulary usage in their narrative tasks. The level of speaking also increased because students used the phonetics rehearsal apps, practicing it in a low-stakes setting and then engaged in the discussion in the classroom.

Teacher Insights

There was overall positive feedback regarding teacher feedback, with most saying that the UDL strategies were helpful to the whole class, and not only the neurodiverse cohort. Teachers indicated that the transition to the buffet-style curriculum in place of the one-size-fits-all curriculum minimized the obligation to provide individual accommodations since accessibility was incorporated into the lesson early in the lesson. Nevertheless, educators also reported major challenges of a first-time investment needed to prepare multimodal materials and a steep learning curve related to adopting new assistive technologies. Regardless of these challenges, it was generally agreed that the transition was well worthwhile due to the heightened student agency and the decreased disruptions of behavior.

Success Stories

A particularly successful case was the example of a student with high-functioning autism who had problems with the conventional method of writing essays because of executive functioning difficulties. Given the choice of creating a Visual Essay with the help of a digital storyboard tool, the student created an extremely detailed analysis of *The Great Gatsby*, color-coding and spatial organization to illustrate the more complex relationships between characters than he/she had ever done in a conventional text-based format. The other example is that of a student with ADHD who used noise-cancellation headphones and a flexible seating setup to finish a standardized reading test in half the length of a normal test, which proved that environmental accommodations are as important as instructional accommodations.

Challenges and Limitations

Although the research had evident advantages, there are a number of limitations that should be noted. Digital divide has been a considerable obstacle; effectiveness of UDL is in many cases interconnected with the quality of the hardware and constant internet connection, which is not always available in educational institutions. Moreover, the study was limited in time (one academic term) which complicates the evaluation of long-term retention of language skills. Lastly, the sample size of 40 students is too small to be used in generalizing the results to the larger groups of people. The following applications should be attentive to the fact that systemic professional development should be considered so as to make UDL a lasting pedagogical norm and not an intervention.

Conclusion

The results of the current research highlight the radical promise of the Universal Design of Learning (UDL) framework within the English classroom at the secondary level, showing that the flexibility of teaching is the key to neurodiverse achievement. The results show that the engagement and the language acquisition of neurodiverse students increase significantly when the traditional, text-based models are substituted with multimodal ones. With the help of digital scaffolds like text-to-speech software and choice-based tests, students with dyslexia, ADHD, and ASD managed to overcome mechanical barriers to literacy, which uncovered an insight of analytical thinking that used to be obscured by the strict curriculum requirements. The results demonstrate a 35% growth in active participation of students, and significant improvement in measures of language acquisition, namely, reading comprehension and narrative writing. These findings suggest that the inclusive education system needs to transition into a receptive accommodation model to a proactive and systemic design with accessibility being a default and not an option. In the case of practitioners, this requires a reorientation towards an understanding of literacy in a multimodal sense in which the terms reading and writing cover a wide range of digital and oral manifestations. Sustained professional development and technological infrastructure should therefore be the key priority of policymakers and school administrators to make these inclusive strategies scalable and sustainable. Other studies in the future ought to build on these results by undertaking longitudinal research to determine the long-term consequences of UDL on standardized proficiency and the social-emotional well-being of neurodiverse learners in various socio-economic backgrounds. Overall, the study concludes that UDL is not only valuable to a particular segment of students, but it creates a fair and challenging learning experience that enables every student to independently and confidently challenge the demands of the English language.

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