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MULTIMODAL LEARNING FOR NEURODIVERSITY: TRANSFORMING GRAPHIC DESIGN AND MEDIA EDUCATION THROUGH INCLUSIVE CURRICULUM DESIGN

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Abstract

This study examines the implementation of inclusive educational practices in higher education to support neurodivergent students, using a Graphic Design and Media course at Malmö University as a case study. Through action research methodology, we transformed traditional text-heavy course learning materials into a multimodal approach incorporating diverse media formats. The research revealed significant improvements in student engagement and satisfaction, particularly among neurodivergent learners. Our findings show how diversifying course literature with blogs, videos, podcasts, and interactive elements creates more accessible learning pathways. The redesign was guided by the Web Content Accessibility Guidelines and principles of transition and inclusive design. This article presents a replicable model for enhancing inclusivity in higher education curricula, contributing to wider discussions about supporting neurodiversity in academic settings. The approach addresses immediate accessibility needs while advancing personalised learning experiences, ultimately improving retention and completion rates across diverse student populations.

Keywords: Neurodiversity, Inclusive education, Graphic design education, Media education, Action research, Multimedia learning, Higher education, Online learning

Introduction

Higher education institutions increasingly recognise the importance of inclusive educational practices that acknowledge and accommodate student diversity, particularly neurodivergence. The neurodiversity paradigm challenges deficit-oriented medical models, advocating instead for recognising neurodivergent individuals as integral contributors to human diversity rather than subjects for normalisation (Xia et al., 2024). This perspective encompasses conditions such as dyspraxia, dyslexia, attention deficit hyperactivity disorder, dyscalculia, autism spectrum, and Tourette syndrome (Clouder et al., 2020). Research suggests neurodivergent students constitute a significant proportion of the student population globally, with estimates indicating neurodiverse students make up at least 11% of enrolled undergraduates and possibly account for up to 30% of students in international contexts. In Swedish higher education, the documented proportion of students receiving targeted pedagogical support (riktat pedagogiskt stöd) for neurodevelopmental conditions increased from 0.3% in 2011 to 2.7% in 2023, though broader surveys suggest that 17–27% of Swedish higher education students report functional impairments affecting their studies (UHR, 2015; Universitetslararen, 2024).

Traditional educational approaches often present barriers for neurodivergent students, particularly through text-heavy learning materials and limited format options. In educational contexts, designing inclusive course materials requires addressing various challenges associated with neurodiversity. Knight (2022) notes that “students with ADHD, for example, may be hyper-focused, high-energy learners, but struggle with executive functioning skills that are essential for the successful completion of day-to-day tasks and the understanding of complex problems.” These challenges highlight the importance of developing educational resources and learning activities that accommodate diverse learning needs and information processing styles. Importantly, improving course accessibility benefits both neurodivergent and neurotypical students¹.

This article explores how course inclusivity can be improved through diversification of course literature embedded in learning activities, utilising the Graphic Design and Media course at Malmö University as a case study. We address the pressing need for awareness and implementation of accessible educational resources in higher education, providing a replicable model for other courses and institutions. Future research will explore the long-term impacts on academic retention and completion rates² through action research and investigate additional strategies, such as assistive technologies, to support neurodivergent students.

¹ Chaue Bruise, as advised by Dr. Dannell Roberts uses “neurotypical” as a term “to describe individuals with typical neurological development or functioning. It is not specific to any particular group, including those with autism spectrum disorder. In other words, it is not used to describe individuals with autism or other developmental differences” (Bruise, 2021)

² Retention and graduation rates are important indicators of student success (Kuh et al., 2006). These indicators have been defined as “the percentage of a school’s first-time, first-year undergraduate students who continue at that school the next year” and “the percentage of a school’s first-time, first-year undergraduate students who complete their program within 150% of the published time for the program” (Fass-Holmes, 2016).

Accessibility guidelines and inclusive design practices (Interaction Design Foundation, 2023) guided our modifications towards incorporating World Wide Web Consortium (W3C) approved online content alongside additional videos, blogs, podcasts, and interactive elements. The updated course materials specifically aim to support neurodivergent learners while creating a more inclusive learning environment for all students.

Theoretical Framework

Neurodiversity in Higher Education

The neurodiversity movement advocates for recognising and valuing neurological differences as natural variations of human cognition rather than deficits to be corrected (Xia et al., 2024). In higher education contexts, this perspective encourages institutions to adapt their approaches to support diverse learning needs rather than expecting students to conform to standardised methodologies.

Neurodivergent students experience learning differences that encompass unique strengths and challenges. These students often excel in creative thinking, pattern recognition, and detail-oriented tasks, while potentially facing challenges with executive functioning, social interactions, or sensory processing (Knight, 2022). These varied cognitive profiles call for multimodal approaches to learning that can leverage strengths and provide support for challenges.

Inclusive Design and Education

Inclusive design principles describe “methodologies to create products that understand and enable people of all backgrounds and abilities” (Alita, 2022). In educational contexts, these principles translate into creating learning environments and materials that are accessible to all students, regardless of their cognitive, sensory, or physical characteristics.

It is “a philosophy and approach to teaching and learning that seeks to ensure all students, including those with disabilities or diverse learning needs, are provided with meaningful opportunities to participate in and benefit from education” (Ranbir, 2024). In this research, inclusive education serves as a foundational theoretical framework that guides our course redesign and pedagogical approach to supporting neurodivergent learners. By implementing multimodal learning materials, diversified course resources, and action research methodology, we create learning environments in which neurodivergent students are recognized as active participants with diverse cognitive strengths that are valued, rather than as individuals requiring remediation or normalization.

Transition Design

Our approach was further informed by transition design principles, which offer frameworks for addressing complex systemic problems through intentional shifts towards more sustainable and equitable futures. As Irwin and Kossoff (2024) explain, “Transition design is an emerging, transdisciplinary area of research, study, and practice aimed at addressing systemic (wicked) problems and thereby catalysing societal transitions towards more sustainable, equitable, and desirable long-term futures.”

In our context, transition design guided the transformation of educational approaches by engaging students as active participants in constructing the course curriculum rather than as passive recipients of predetermined content.

Methodology

Action Research Approach

An action research methodology was employed to address the unique needs and strengths of neurodivergent students in the Graphic Design and Media course at Malmö University. We selected action research because it is a participatory and reflective methodology that solves practical problems while generating knowledge. The process involves iterative cycles of planning, acting, observing, and reflecting, enabling participants to actively contribute to the research process and implement meaningful changes in their specific contexts (Kemmis et al., 2014).

The action research process consisted of four key cycles:

- Planning: Developing the course plan, identifying improvements to be made in course literature, and setting clear objectives and necessary resources.
- Acting: Conducting surveys to gather student feedback, which is crucial to understand participant needs and inform targeted adjustments (Malmö University 2024).
- Observing: Monitoring learning activities, retention rates, and completion rates, assessing the effectiveness of changes and identifying emerging issues.
- Reflecting: Evaluating project outcomes, providing insights for future planning, and ensuring continuous improvement.

Integration with Design Methodologies

We further enhanced our approach by integrating inclusive design methodologies (Alita, 2022) alongside transition design principles. Through this process, students shifted from passive subjects to active participants in constructing the course curriculum and criteria, advancing meaningful change within the course.

Data Collection

Following the administration of traditional evaluation surveys at Malmö University, students provided insights and appraised the courses. The data collected from these surveys was grounded in action research, according to which the students were primarily involved in the initial phase of the process. In the subsequent phase, through the implementation of a transition design process, the course was made more inclusive.

Our primary focus was supporting neurodivergent students by identifying areas in which the course curriculum could better align with inclusive design principles and desired learning outcomes. Feedback

from prior students, collected via voluntary contributions and surveys, served as the foundation for identifying existing barriers and informing course improvements. Rather than specifically recruiting neurodivergent participants, our methodology utilized anonymous surveys and voluntary student contributions, which allowed students to self-identify their experiences. These contributions included unprompted reflections on course literature effectiveness that did not necessitate disclosure of neurodivergent identity or diagnosis.

Drawing from qualitative student evaluations (Grafisk design och medier-HT24 Survey, Malmö University, 2020–22, 2023–24), we analysed satisfaction rates for syllabi during these periods to assess the impact of implemented changes. Data from 2020–22 represents the course baseline, while 2023–24 evaluations reflect the period following curriculum redesign and implementation of multimodal resources.

Course Redesign and Implementation

Multimodal Approach to Learning Materials

Based on student feedback, the course was transformed from a text-heavy to multimodal curriculum structure featuring:

- Videos and podcasts to supplement core readings and accommodate diverse learners
- Interactive and open-access materials, including tutorials from industry professionals and guides from platforms such as Adobe and Canva
- Syllabus modules that blend theoretical principles with practical applications, such as video tutorials on layout and grid design

For instance, a syllabus section teaching “Tools, Grids, and Layouts” includes a video tutorial created by a professional graphic designer, elucidating fundamental principles of layout and grid design³. This module integrates theoretical principles with practical applications, creating an inclusive environment that empowers students to leverage their creative and innovative potential.

Structural Changes to Support Diverse Learners

Compulsory reading elements were standardised to ensure consistent engagement, and specialised modules were introduced for students seeking advanced knowledge in areas such as branding and UI/UX design. Early and comprehensive tutorials for key design tools were also implemented in response to student feedback highlighting the need for software skill development.

As noted by a student in the 2024 Survey: “More tutorials or software workshops: It would have been good to have more tutorials or workshops for those who wanted to learn the basics of the Adobe

³ Syllabus example: Shapes by Sean, 2022.

programs. More program demos at the beginning of the course, some that were shown in the final exercise, should be nice to include earlier.”

The goal was to support neurodivergent students by building on their strengths and creating a learning environment that values their diverse skills and perspectives. Traditional course materials, often heavily focused on extensive formal reading, were supplemented with various multimedia resources to create a more engaging, interactive, and dynamic learning experience.

Results

Resource Diversification Analysis

In response to feedback aimed at promoting an accessible learning environment, diverse multimedia content was integrated into the updated course syllabus. Figure 1 illustrates the distribution of added course resources by media type.

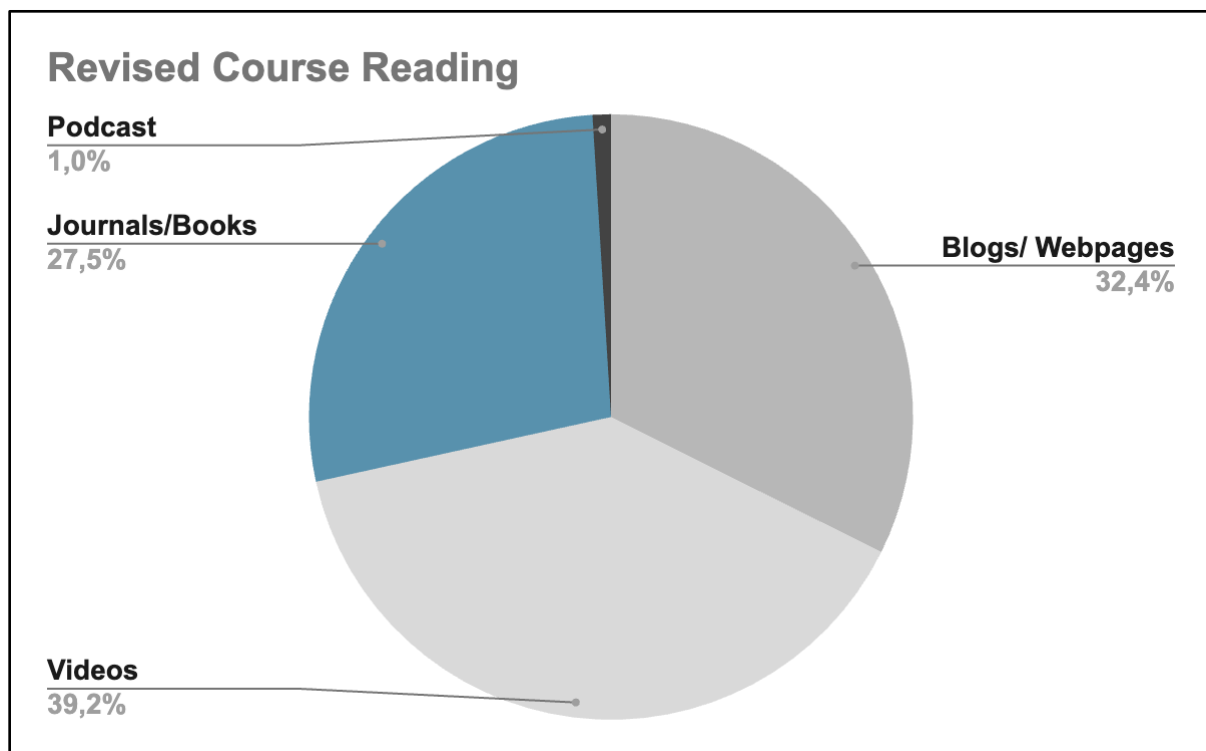


Figure 1. Distribution of added course resources by media type, showing the proportion of different formats implemented to support diverse learning styles. The chart demonstrates the strategic emphasis on multimodal content with Videos (39.2%), Blogs/Webpages (32.4%), Traditional Academic Journal Articles and Books (27.5%), and Podcasts (1%).

The incorporation of varied resources accommodates different learning preferences and enhances overall student engagement. The emphasis on multimedia formats reflects a trend towards diversifying learning materials and focusing on visual and interactive learning.

Student Satisfaction and Feedback

Based on evaluations (2020–22 and 2023–24), our approach aimed to enhance course literature to be more inclusive and supportive of neurodiverse students within higher education. This feedback has proven successful in improving content materials. As noted by a student participant in 2024, “Just a thank you! The assignment examples, recordings, available course literature, and the mix of articles, literature, and videos in the ‘reading material’ were great—especially helpful for a neurodivergent mind!” (Malmö University, 2024).

Figures 2 and 3 illustrate measures of student satisfaction for various improvement areas identified in the evaluation surveys for Spring 2024 and Autumn 2024 respectively.

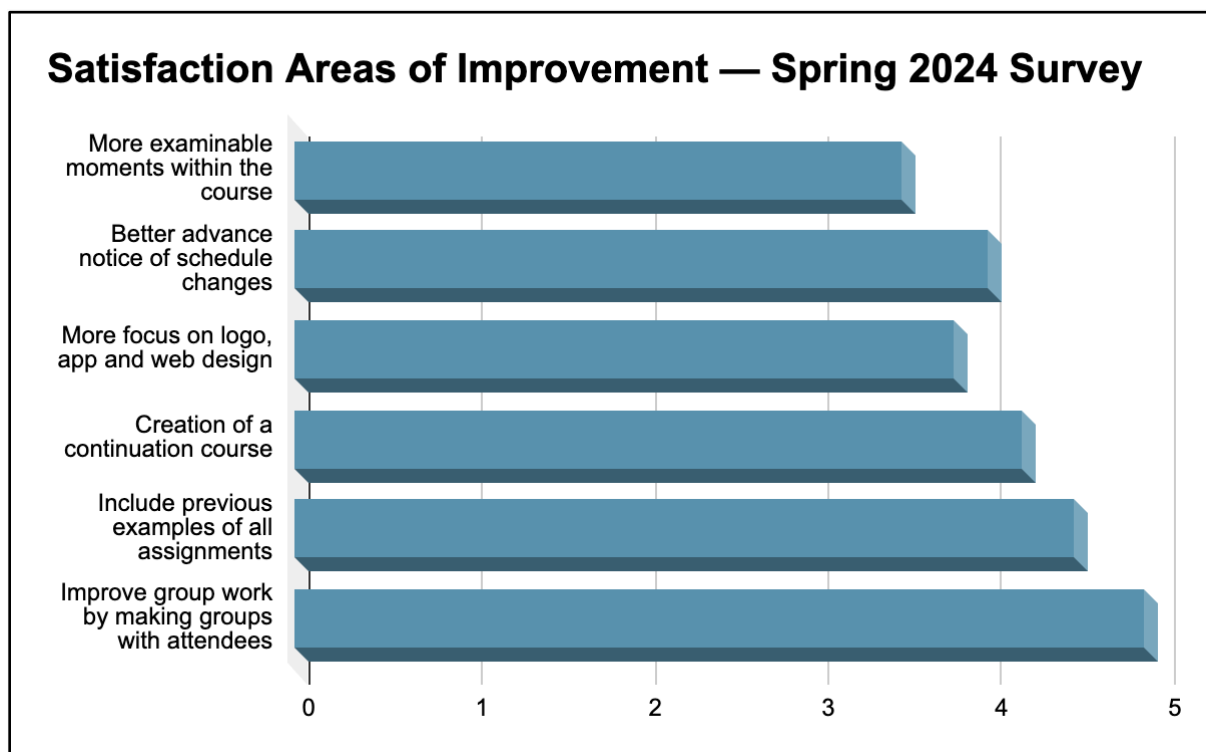


Figure 2. Student satisfaction ratings (scale 1–5) for improvement areas identified in Spring 2024 evaluation surveys. Higher ratings indicate greater student satisfaction with how these areas were addressed. Areas include the need for more examinable moments, better schedule change notifications, enhanced focus on digital design components, creation of a continuation course, inclusion of assignment examples, and improved organisation for group work.

Derived from these satisfaction surveys, lack of access and training in design software, such as Adobe Creative Cloud, was a significant student concern. Student participants recommended increasing tutorials and workshops for these tools and ensuring timely access for everyone. Additionally, task instruction clarity and overall course organisation, especially on the Canva platform, required improvements in both periods.

During 2023–24, students identified several challenges related to accessibility, organisation, group work, content depth, and student support from class facilitators. More advanced theoretical and practical content was requested, including a more thorough analysis of grid systems, typography, and design theory, indicating an evolution in student expectations towards more specialised knowledge.

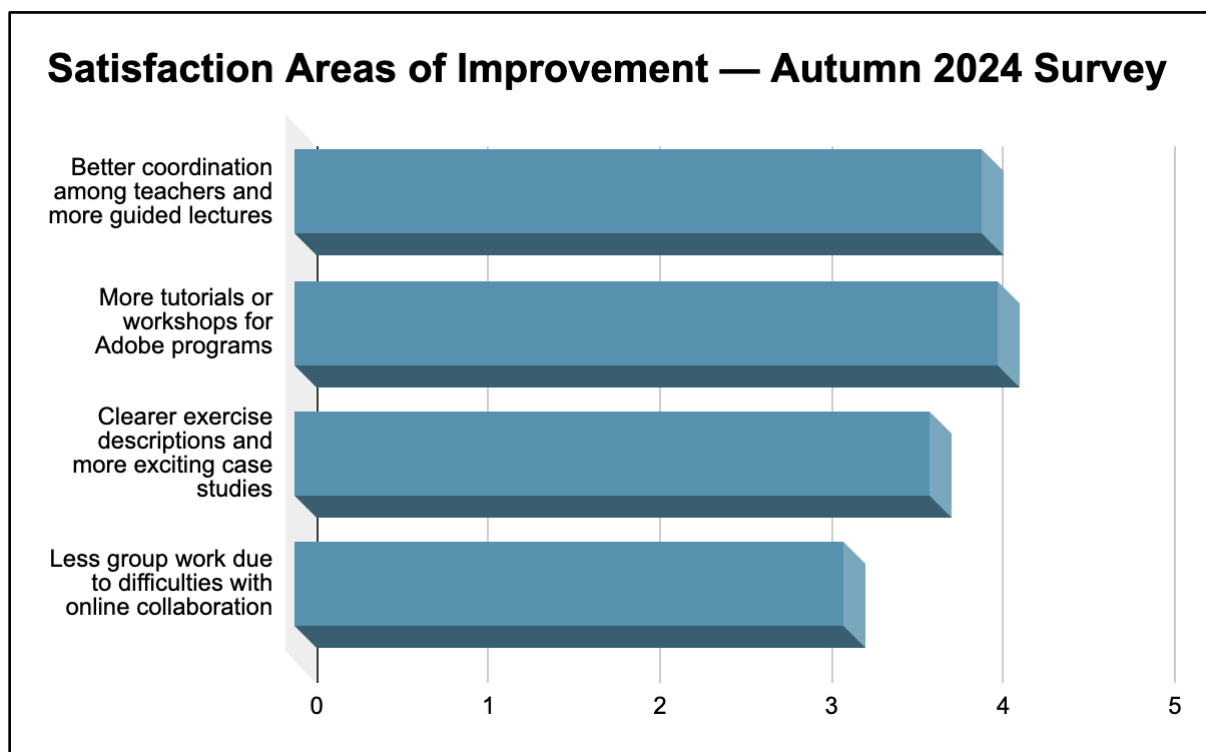


Figure 3. Student satisfaction ratings (scale 1–5) for improvement areas identified in Autumn 2024 surveys. Areas include teacher coordination and lecture guidance, Adobe tutorials, assignment clarity, case study engagement, and group work challenges related to online collaboration.

Addressing Student Needs

Traditional academic articles were often challenging and less accessible for neurodiverse students who have difficulty reading or maintaining focus for long periods. To counter this, multimedia resources were implemented to support varied learning styles. Educational video tutorials from design and media specialists were integrated alongside concise readings from reputable professional sources such as Adobe and Canva. These resources offered practical, relevant content while supporting a more inclusive learning environment and widening participation with learning activities and outcomes.

Overall, the action research methodology enabled the course to evolve continuously with participants, addressing immediate challenges and enhancing the learning experience for a diverse student body. The

updated curriculum reflects a commitment to inclusivity, adaptability, and continuous improvement of educational practices in the Graphic Design and Media course at Malmö University.

Discussion

Overcoming Barriers to Access

One critical issue identified in our research was the density of typical academic reading assignments and the potential inaccessibility of these articles as the predominant source of learning material. For some students, dense texts may appear daunting, potentially resulting in disinterest or discomfort with the material. These materials may be inaccessible in other ways to neurodivergent students as well as students who are Deaf and/or disabled, leading to a disconnection between students and educational materials.

We addressed these issues by diversifying the types of course literature provided to students and varying the requirement levels for assigned readings and topics. We reduced the number of required academic articles, instead exploring other media and potential resources that may be more accessible for neurodivergent learners. This included carefully vetted blog posts, shorter and more visually accessible journal articles, videos, podcast episodes, and infographics to convey similar information using various media.

These changes were intentionally made to accommodate individual students' lifestyles, schedules, and abilities. We ensured all resources were open access to avoid students being left behind due to paywalls and unnecessary barriers. The primary goal was to avoid isolation and improve the student learning experience while improving learning outcomes.

Implications for Higher Education Practice

Our findings suggest several important implications for higher education practice:

1. Diversified learning resources benefit all students, not just those with identified neurodivergence.
2. Multimedia integration should be considered a standard approach rather than an accommodation.
3. Student feedback is essential for the continuous improvement of inclusive design practices.
4. Software skill development needs to be integrated earlier and more thoroughly in creative disciplines.
5. Open-access materials reduce barriers to learning and increase educational equity.

These implications align with wider discussions in higher education about universal design for learning and the benefits of multimodal approaches for all students.

The Future of Accessibility in Higher Education

For future considerations regarding equitable resource implementation, we could look toward developments in assistive technologies based in artificial intelligence for academic accessibility. With equitability-based implementation, “these technological innovations are poised to significantly improve communication, interaction, and social engagement for individuals with autism, offering a glimpse into a future where AI plays a pivotal role in supporting neurodiversity” (Barua et al., 2022).

Assistive technologies currently in development follow similar principles and techniques of previously existing assistive technologies; however, “AI advances in predictive text, visual recognition, and speech-to-text transcription are so far showing enormous potential for helping people with vision, hearing, cognitive, learning, and mobility disabilities” (Mehigan, 2020).

One benefit of these assistive tools, separating them from traditional tools, is their ability to adapt to individual student needs and provide personalized assistance, as “the learning needs of a student depend on the severity and precise nature of how that disorder affects them, and thus vary from one student to another” (Barua et al., 2022). As with any accessibility tool or metric, AI-based assistive tools nonetheless cannot serve as a universal solution for all students experiencing academic barriers due to disability.

We recommend that future experimental implementation assessments of curriculum impact and student retention be conducted following a similar Action Research methodology as outlined in this study.

Conclusion

The implementation of inclusive practices and improvements in the accessibility of educational materials in the Graphic Design and Media course represents significant progress in supporting neurodivergent students and fostering more equitable learning environments within higher education. Diversifying course resources to encompass multimedia content, including videos, podcasts, and blogs, alongside academic articles, effectively addresses different learning needs and information processing styles. This approach, informed by inclusive design principles, transition design, action research, and grounded in student feedback, has shown efficacy in enhancing student engagement, comprehension, and satisfaction. These curriculum modifications particularly benefit neurodivergent learners by offering multimodal resources and structured support that accommodate diverse cognitive processing styles. The Action Research methodology, characterised by iterative cycles of planning, acting, observing, and reflecting, facilitates the continuous evolution of course curriculum, ensuring modifications address immediate challenges and enhance the overall learning experience.

Looking forward, exploring assistive technologies has promising potential to further personalise support for students with diverse learning needs. The development of these tools must prioritise personalisation to meet each student’s unique profile. Ultimately, sustained commitment to improving accessibility not only benefits neurodivergent students but also enriches the educational experience for the entire student body, thereby promoting retention and completion rates.

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