Human Systems Engineering and Design (IHSED 2026), Vol. 237, 2026, 576–586
https://doi.org/10.54941/ahfe1008197

An Inclusive Teacher-Centred Platform for AI-Supported Adaptive Learning in Neurodivergent Children

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ABSTRACT

Neurodivergent children in elementary school, specifically those with Autism Spectrum Disorder (ASD) or Attention Deficit Hyperactivity Disorder (ADHD), require learning tasks tailored to their sensory and cognitive profiles. However, educators face significant workloads when personalising materials, often hindered by digital tools lacking transparency and professional control. This paper proposes an inclusive, teacher-centred platform featuring a gamified assistant for adaptive learning. Its core is a controlled AI pipeline that transforms professional materials into safe, traceable activities. A participatory focus group with teachers, therapists, and neurodivergent adults established six foundational design recommendations mapped to safety and human diversity. To ensure safety and agency, the architecture needs an AI-output validation via a Human-in-the-Loop (HITL) dashboard and active source grounding. To prioritise emotional safety, traditional timers should be replaced with progress-based temporal anchors, while sensory safety is enhanced through a personalised audio environment integrating teacher voice recordings. Additionally, native sensory toggles and non-destructive navigation mitigate cognitive fatigue. This work contributes a transparent framework for adaptive task generation, addressing opacity and loss of professional agency in AI-supported special education.

Keywords: Neurodivergent children, Inclusive design, Adaptive learning, Virtual assistant

INTRODUCTION

Neurodivergent children in the first cycle of elementary school, including those with Autism Spectrum Disorder (ASD) or Attention Deficit Hyperactivity Disorder (ADHD), benefit significantly from educational activities tailored to their unique cognitive profiles, sensory preferences, and learning paces (Meyer et al., 2014). However, the practical implementation of individualised teaching remains a daunting challenge. Teachers and therapists often face an overwhelming workload when creating, adapting, and monitoring customized materials (Luckin, 2018), particularly when available digital tools offer limited transparency or weak professional control.

Received May 15, 2026 Revised June 23, 2026 Accepted July 12, 2026 Available online September 25, 2026

In the promptly evolving landscape of Artificial Intelligence (AI) in education, a critical tension exists between automated adaptability and professional agency (Biesta, 2015). Many existing AI-driven systems operate as “black boxes”, where the logic behind task generation and student adaptation is opaque to the practitioner (Shneiderman, 2022). For neurodivergent learners, this lack of predictability can be detrimental, as their learning environments require high levels of consistency and sensory safety (Porayska-Pomsta et al., 2018). Consequently, designing systems for human diversity demands a paradigm shift: moving away from unconstrained AI generation towards structured, teacher-centred architectures that support professional decision-making without increasing cognitive load.

This work presents the foundational design requirements and conceptual architecture of an inclusive, teacher-centred web platform featuring a gamified virtual assistant. Unlike traditional generative systems, this platform employs a controlled AI-driven pipeline that transforms professionally provided materials into age-appropriate educational tasks. By embedding professional-defined constraints directly into the generation process, the system aims to balance adaptive flexibility with pedagogical oversight and safety (Holmes et al., 2019).

To validate this architecture, a participatory design approach was adopted. This paper specifically analyses the results of a focus group involving a diverse panel of stakeholders, including teachers, therapists, and neurodivergent individuals. Their insights provide a foundational understanding of the requirements for transparency, control, and sensory-aware design in AI-supported learning. The following sections detail the theoretical framework, the methodology of the stakeholder consultation, and the emerging design recommendations that prioritise safety and agency in the context of human diversity (Gaudion & Hall, 2015).

STATE OF THE ART

AI in Inclusive Education: From Automation to Teacher Agency

The integration of Artificial Intelligence in Education (AIEd) has shifted from simple rule-based systems to complex generative models capable of creating personalised learning paths (Luckin, 2018). However, a significant gap remains in how these systems address the specific needs of neurodivergent learners. Current literature often prioritises automation over augmentation, frequently sidelining the teacher’s expertise. Shneiderman (2022) argues that the development of Human-Centred AI (HCAI) must prioritise human control and empowerment, ensuring that technology amplifies rather than replaces human capabilities. In the context of inclusive education, this is particularly vital, as teachers are not merely technical executors but ethical and pedagogical decision-makers (Biesta, 2015). Consequently, an effective AI-supported system must function as a cognitive scaffold, where a Human-in-the-loop (HITL) architecture ensures that the professional maintains the ultimate authority over the learning process (Holmes et al., 2019).

Designing for Human Diversity: Sensory and Functional Profiles

Traditional educational software has historically relied on a "design-for-diagnosis" model, which often overlooks the fluctuating needs of individual learners (Meyer, Rose and Gordon, 2014). Contemporary frameworks, such as Universal Design for Learning (UDL), advocate for the creation of flexible learning environments that accommodate a wide range of human diversity (Meyer, Rose and Gordon, 2014). This shift acknowledges that barriers to learning often reside in the environment's failure to adapt to the user's specific profile (Milton, 2012). Research into the lived experience of neurodivergent individuals suggests that sensory-aware interfaces are essential for preventing cognitive overload and sensory fatigue (Gaudion and Hall, 2015). Therefore, inclusive systems design must move beyond clinical labels to address granular functional requirements, such as adjustable luminosity, contrast, and visual simplicity (Gaudion and Hall, 2015; Mostafa, 2015).

Safety, Transparency, and the Black-Box Problem

Generative AI models are often described as "stochastic parrots" (Bender et al., 2021), prone to generating factually incorrect or inappropriately adapted content, commonly referred to as hallucinations. This unpredictability is compounded by the internal logic of the AI remaining opaque to the user, which is known in AI systems design as the black box problem. So, the deployment of Large Language Models (LLMs) in educational settings introduces significant risks regarding pedagogical and technical safety. To mitigate these risks, recent literature highlights the imperative for Explainable AI (XAI) and Source Grounding, which enable practitioners to trace and verify the information generated by the system (Meskó and Topol, 2023). Establishing such transparency is a foundational requirement for building trust and ensuring the reliability of AI-supported interventions in sensitive child-centred contexts.

The Gamification Paradox: Motivation and Emotional Safety

While gamification is a popular strategy for increasing engagement (Deterding, 2012), its application in neurodiverse contexts presents a significant paradox. Traditional mechanics, specifically countdown timers and competitive rankings, can act as severe panic triggers for children with ADHD or anxiety. According to Cognitive Load Theory (CLT), such extraneous stressors can overload the learner's working memory, effectively blocking the processing of educational content (Sweller, Ayres and Kalyuga, 2011). To ensure psychological safety, digital learning environments must redefine temporal management, moving away from time-pressured tasks towards progress-oriented and non-competitive feedback loops. This approach prioritises the student's emotional well-being, fostering intrinsic motivation through personal achievement rather than social comparison.

Synthesis and Research Gap

Whilst the literature establishes a robust theoretical framework for inclusive AI, there remains a significant gap in translating these high-level principles into functional system requirements for the first cycle of basic education. Most existing commercial adaptive learning platforms and research prototypes, including those mentioned by the focus group participants, such as *Escola Virtual* (Porto Editora, 2024) or Hot Potatoes (DAN Online Tools, 2024), tend to operate as black boxes. These systems often prioritise automation over professional oversight, offering limited transparency and making the personalisation process time-consuming for practitioners (Holmes *et al.,* 2019; Porayska-Pomsta *et al.,* 2018).

Furthermore, many current digital tools, including institutional platforms like Blackboard (Blackboard Inc., 2024), frequently present navigation and organisational challenges that can lead to significant user frustration. These systems are often designed around rigid diagnostic labels rather than the fluid sensory and functional profiles advocated by Universal Design for Learning (Meyer, Rose and Gordon, 2014). To address this discrepancy and move towards a model of hybrid intelligence (Molenaar, 2022), the present study adopts a participatory design methodology. This approach seeks to operationalise the concepts of professional agency and psychological safety by gathering empirical evidence from both clinical experts and neurodivergent users. By doing so, this work aims to define a new architecture for AI-supported learning that balances technological adaptability with meaningful human control (Shneiderman, 2022).

METHODOLOGY

Research Design and Participatory Approach

This study employs a qualitative, participatory design approach to identify the foundational requirements for an inclusive, AI-supported learning platform. A focus group was used as the primary data collection method to promote the early involvement of key stakeholders in the design process (Saunders *et al.,* 2023). Thus, the research ensures that the resulting system architecture addresses real-world pedagogical challenges and the specific sensory needs of neurodivergent learners.

Scope: ASD and ADHD Relevance

The research specifically addresses ASD and ADHD, a selection driven by the high and increasing prevalence of these conditions in modern educational settings. According to the Centres for Disease Control and Prevention (CDC, 2023), the prevalence of ASD has risen significantly to 1 in 36 children, while ADHD remains one of the most frequently diagnosed neurodevelopmental disorders, affecting approximately 5% to 7% of the school-age population (Sayal *et al.,* 2018). In the Portuguese context, official reports from the Directorate-General for Education (DGE) further confirm a steady increase in students requiring specialized pedagogical support under the inclusive education legal framework (Decree-Law 54/2018). This upward trend underscores the urgent necessity for scalable, AI-supported tools that can accommodate a growing and diverse student population.

Participant Selection and Profiling

A purposive sampling strategy was employed to recruit a diverse panel of six participants, categorized into pedagogical expertise (P1–P4) and the lived experience of neurodiversity (P5–P6) (Table 1). All participants volunteered for the study and provided written informed consent, ensuring full adherence to institutional ethical standards and the protection of anonymity through the use of alphanumeric codes.

Table 1: Focus group participant profiles.

Code	Sex	Age	Role/Expertise	Years of Experience	Key Perspective Provided
P1	F	47	Special education teacher	Extensive (K-9)	Pedagogical adaptation and school context.
P2	F	44	Speech and language therapist	Senior lecturer / clinical	Linguistic development and communication.
P3	F	45	Occupational therapist	Senior lecturer / clinical	Sensory integration and ASD expertise.
P4	F	39	Occupational therapist	12+ years	Sensory processing and functional profiles
P5	F	25	Higher education student	User experience	Lived experience of ADHD and anxiety.
P6	M	21	Higher education student	User experience	Lived experience of ASD.

The expert subgroup comprised a special education teacher, a speech and language therapist, and two occupational therapists, collectively offering extensive experience in early childhood intervention and sensory integration. The lived experience perspective was provided by two higher education students identified by the "*Núcleo de Promoção da Inclusão, Desenvolvimento e Sucesso dos Estudantes*" (Centre for the Promotion of Inclusion, Development and Student Success - NPIDSE) at the University of Minho. The methodological decision to involve neurodivergent adults rather than children at this stage was strategic, prioritizing the value of their retrospective insights into the specific barriers and sensory triggers navigated during elementary school. Furthermore, their communication skills allowed for a more granular and effective translation of complex neurocognitive needs into actionable design requirements for the platform architecture.

Data Collection Procedure

The consultation took place on 20 March 2026 at the Institute of Education of the University of Minho, adopting a semi-structured focus group format that lasted approximately 90 minutes. Moderated by the lead researcher, the session was organized around four primary thematic axes to ensure a comprehensive elicitation of requirements.

The discussion began with an assessment of the participant's familiarity and frustrations with existing digital educational tools, followed by an exploration of interface design preferences regarding visuals, feedback, and gamification elements. Furthermore, the group addressed the complex role of AI in material co-creation and pedagogical safety, concluding with a focused analysis of data transparency and the preservation of professional agency. This narrative structure allowed for a deep dive into the technical and emotional needs of the stakeholders, ensuring that the resulting design recommendations are grounded in real-world professional expertise and lived experience.

Data Analysis and Ethics

The focus group session was audio-recorded with the explicit informed consent of all participants. The resulting 14-page transcript was subsequently analysed using thematic analysis to identify recurring patterns related to design requirements (DR) and user concerns (UC). These themes were then mapped onto the platform architectural specifications, supporting the translation of all participants' perspectives into pedagogical, usability, and sensory-related considerations. Ethical procedures were strictly followed throughout the study, including informed consent, anonymisation of all personal data, confidentiality of responses, and secure handling of the collected data. Participants were also informed of their right to withdraw from the study at any stage of participation.

FINDINGS & ANALYSIS

The thematic analysis of the stakeholder consultation provided a rich multi-dimensional perspective on the requirements for an inclusive, AI-supported learning environment. The results are organised into three thematic pillars: Professional Supervision and AI Reliability, Sensory Ergonomics for Functional Profiles, and the Psychological Impact of Gamification.

Human-in-the-Loop: Navigating AI Reliability and Professional Agency

A primary concern raised by the practitioners (P1–P4) relates to the tension between algorithmic autonomy and pedagogical safety. While the participants acknowledged the efficiency of Generative AI in adapting educational materials, they expressed significant apprehension regarding the opaque nature of these systems. As P1 noted, even minor linguistic adjustments made by an AI can inadvertently alter the scientific accuracy or the intended pedagogical objective of a task: *"I still don't have enough confidence to let [the AI] do everything on its own... it often changes small words that completely alter the intended meaning."*

Consequently, the findings suggest that for an AI system to be considered safe within an inclusive context, it must operate under a strict HITL architecture. The practitioners argued that the system should function as a co-creation assistant rather than an autonomous decision-maker. This requirement for professional oversight is not merely a matter of data accuracy but of ethical responsibility. Table 2 summarises the core requirements for AI governance as defined by the expert panel.

Table 2: Professional requirements for AI governance and supervision.

Requirement	Description	Strategic Objective
Mandatory validation	No AI-generated content is delivered without explicit teacher approval.	Ensure pedagogical rigour and safety.
Source grounding	The system must highlight the specific source material used for generation.	Facilitate quick fact-checking and transparency.
Differentiated tone	Formal register for professional reports; informal/supportive for students.	Adapt communication to the target audience.
Metric interpretation	Priority on bar charts showing strengths and persistence over binary scores.	Support qualitative professional intervention.

Sensory Ergonomics: Beyond Diagnosis-Centred Design

The consultation with neurodivergent participants (P5–P6) revealed a critical need to transition from design for diagnosis to design for functional profiles. The lived experience of the participants suggests that neurodivergent learners' ability to process information fluctuates according to daily mental fatigue and environmental stressors. P5 highlighted this temporal instability, noting that: "*What works for me one day, or even one hour, might not work a little later...*".

In a separate instance, the same participant illustrated how specific environmental triggers contribute to this cognitive drain, stating: "*Fluorescent colours tire me out immensely; my brain feels completely exhausted... the more customisation there can be, the better.*" This insight demands a sensory-neutral approach to interface design, where the visual environment acts as a regulatory tool rather than a distractor, prioritizing the reduction of sensory noise to preserve the learner's cognitive resources (Mostafa, 2015). The experts (P3, P4) further corroborated this, suggesting that visual syntax, such as the Fitzgerald Key (Fitzgerald, 1949), could be integrated as an optional overlay to support linguistic decoding. The goal is to provide an interface that adapts to the user's sensory state, offering features such as native dark mode and granular control over contrast and luminosity to mitigate fatigue.

The Paradox of Gamification: Emotional Safety and Temporal Management

While mechanics such as countdown timers and competitive rankings are traditionally used to increase engagement, they were perceived as detrimental triggers for neurodivergent learners. Both P5 and P6 reported that visible countdowns induce a state of panic that leads to cognitive blocking, rendering the educational task impossible to complete. P5 vividly described the emotional toll of competitive feedback and the quantitative evaluations: *"We are left thinking... why did I only get this; do I have a problem?"*

To maintain emotional safety, the participants recommended a shift towards non-competitive, progress-based motivation. This involves replacing timers with progress bars and "mystery rewards" that celebrate individual effort rather than comparative performance. Furthermore, the experts highlighted the risk of vocal stimming or echolalia associated with repetitive audio feedback, suggesting that the system must adapt the auditory stimuli to a more natural voice or the professional's voice, preventing interaction loops. Table 3 contrasts the traditional gamification mechanics with the inclusive alternatives proposed by the group.

Table 3: Comparative framework for inclusive gamification and feedback.

Traditional Mechanic	Proposed Inclusive Alternative	Design Rationale
Countdown timers	Progress bars	Minimise anxiety and prevent cognitive blocks.
Competitive rankings	Personal achievement badges	Promote intrinsic motivation over social comparison.
Static audio feedback	Varied, calm, and humanised Voice	Reduce auditory fatigue and mitigate echolalia.
Fixed difficulty levels	Dynamic scaffolding (hidden adjustment)	Maintain engagement without signalling failure.

DESIGN RECOMMENDATIONS

The synthesis of the stakeholder consultation leads to a series of specific Design Requirements (DR) aimed at ensuring the platform pedagogical safety and sensory inclusivity. These recommendations prioritise the teacher's professional agency while providing a resilient and non-threatening environment for the neurodivergent learner.

Technical and Pedagogical Safety

To mitigate the risks of AI hallucinations and preserve pedagogical rigour, the system architecture must implement a strict HITL protocol. The primary recommendation is the integration of a mandatory validation layer within the teacher's dashboard. This feature ensures that no AI-generated content is delivered to the student without prior professional audit. Furthermore, to address transparency concerns, the platform should feature active source grounding. This technical requirement involves the system highlighting the specific fragments of the original teacher-provided materials used by the AI to generate the task. By making the AI's logic traceable, professionals can rapidly verify the scientific accuracy of the proposed activities, thereby maintaining authority over the automated pipeline.

Sensory and Cognitive Accessibility

Addressing the brain exhaustion reported by neurodivergent participants requires a shift towards sensory-aware ergonomics. The interface design must move beyond static accessibility to a dynamic, profile-based model. The authors recommend a sensory control toggle that allows for the instantaneous adjustment of the visual environment. This includes a native dark mode and granular control over contrast and luminosity, accommodating the fluctuating functional states of learners with ASD or ADHD.

Regarding cognitive load, the platform must adopt non-destructive navigation. Inspired by the frustrations expressed with existing learning management systems, this requirement ensures that the user interface remains consistent across all devices and that back buttons or navigational transitions do not reset processes or cause a loss of context. This structural predictability is essential for students with executive function challenges, as it preserves cognitive energy for the learning task itself.

Emotional Safety

To ensure emotional safety and prevent the panic triggers associated with traditional gamification, the system must redefine temporal management. Instead of relying on countdown timers, the platform should implement flexible temporal anchors as an alternative to countdown timers. These temporal anchors allow students or teachers to select non-threatening auditory or visual cues to represent duration. Examples include music-based timers or minimalist progress bars that emphasize personal effort rather than an approaching deadline. This shift aims to create a predictable learning environment that respects each learner's individual pace and effectively mitigates the anxiety typically induced by time-sensitive tasks.

Furthermore, the platform should prioritize auditory regulation through a highly personalized and humanized sound environment. Moving away from automated or synthetic feedback, the system architecture should allow customization of auditory stimuli to ensure they are calm, non-invasive, and familiar to the learner. One significant requirement identified during the stakeholder consultation was the possibility of integrating the voice of the child's own teacher or therapist into the assistant's feedback loops. This human-in-the-loop feature leverages the existing bond between the child and the professional, providing a sense of continuity, familiarity, and security that synthetic voices may not be able to replicate.

Finally, the reward system should support personal achievement mapping by replacing social rankings with individual progress indicators. This approach protects the learner's self-esteem, avoids unnecessary comparison with peers, and fosters intrinsic motivation by emphasizing personal development rather than competition.

The alignment of these design recommendations with the core themes of systems safety and human diversity is synthesized in Table 4.

Table 4: Mapping design recommendations to systems safety and human diversity.

Code	Design Recommendation	Strategic Implementation	Theme Alignment
DR1	Mandatory validation	HITL dashboard for AI output approval.	Safety & agency
DR2	Source grounding	Highlighting original sources in AI tasks.	Transparency
DR3	Sensory toggle	native dark mode and contrast controls.	Human diversity
DR4	Non-destructive navigation	consistent, linear navigation structures.	System adaptability
DR5	Temporal anchors	Progress-based visual indicators as alternatives to countdown timers.	Psychological safety
DR6	Personalized audio environment	Humanized stimuli and integration of teacher/therapist voice recordings.	Sensory & emotional safety

CONCLUSION & FUTURE WORK

This paper detailed the foundational requirements for an inclusive, teacher-centred platform that supports neurodivergent learners through AI-driven task adaptation. By bridging clinical expertise with lived experience, this work operationalises a shift from categorical medical labels to personalised functional profiling. Findings underscore that while AI offers significant potential for reducing workload, strict professional supervision and active source grounding remain vital to prevent pedagogical inaccuracies and maintain authority over the automated pipeline. Furthermore, replacing anxiety-inducing gamified mechanics with progress-oriented temporal anchors and personalised audio environments provides a blueprint for educational tools that prioritise student well-being. Ultimately, by allowing the interface to adapt to the student's fluctuating functional state, the platform fosters a more sustainable and inclusive digital landscape for basic education.

Future efforts will focus on developing a functional prototype structured around two distinct operational interfaces: a professional dashboard for pedagogical oversight and a student-facing environment optimised for sensory regulation. This prototype will undergo usability testing in real settings to evaluate the effectiveness of the AI-driven pipeline, including further refinement of the balance between adaptive flexibility and meaningful human control.

ACKNOWLEDGMENTS

This work has been supported by FCT – Fundação para a Ciência e Tecnologia within the R&D Unit Project Scope UID/00319/2025 - Centro ALGORITMI (ALGORITMI/UM) and Research Centre on Child Studies of the University of Minho, reference UID/00317/2025.

REFERENCES

Bender, E.M., Gebru, T., McMillan-Major, A. and Shmitchell, S. (2021) "On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?", FAccT '21: Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency. Online, 3-10 March, pp. 610–623.

Blackboard Inc. (2024) Blackboard Learn. Available at: https://www.blackboard.com (Accessed: 15 May 2026).

Biesta, G. (2015) "What is education for? On good education, teacher ownership and teacher agency", *European Journal of Education*, 50(1), pp. 75–87.

CDC (2023) Data and Statistics on Autism Spectrum Disorder. Centers for Disease Control and Prevention. Available at: https://www.cdc.gov/autism/data-research/index.html (Accessed: 12 May 2026).

DAN Online Tools (2024) Hot Potatoes - Quizzes. Available at: https://sites.google.com/view/dan-onlinetools/quizzes/hot-potatoes (Accessed: 15 May 2026).

Deterding, S. (2012) "Gamification: designing for motivation", Interactions, 19(4), pp. 14–17.

DGE (2018) Decreto-Lei n. º 54/2018: Educação Inclusiva [Decree-Law 54/2018: Inclusive Education]. Lisbon: Ministry of Education, Portugal.

Fitzgerald, E. (1949) Straight Language for the Deaf. Washington, DC: Volta Bureau.

Gaudion, K. and Hall, A. (2015) Designing Everyday Activities: Living Environments for Adults with Autism. London: Helen Hamlyn Centre for Design, Royal College of Art.

Holmes, W., Bialik, M. and Fadel, C. (2019) Artificial Intelligence in Education: Promises and Implications for Teaching and Learning. Boston: Center for Curriculum Redesign.

Luckin, R. (2018) Machine Learning and Human Intelligence: The Future of Education for the 21st Century. London: UCL Press.

Meskó, B. and Topol, E.J. (2023) "The imperative for regulatory oversight of large language models (or generative AI) in healthcare", *npj Digital Medicine,* 6(1).

Meyer, A., Rose, D.H. and Gordon, D.T. (2014) Universal Design for Learning: Theory and Practice. Wakefield, MA: CAST Professional Publishing.

Milton, D.E. (2012) "On the ontological status of autism: the "double empathy problem", Disability & Society, 27(6), pp. 883–887.

Molenaar, I. (2022) "Towards hybrid human-AI learning technologies", *European Journal of Education,* 57(4), pp. 632–645.

Mostafa, M. (2015) "Architecture for Autism: Built Environment Performance in Accordance to the Autism ASPECTSS™ Design Index", Design Principles and Practices: An International Journal - Annual Review, 8(1), pp. 55–71.

Porayska-Pomsta, K., et al. (2018) "Blended Human-AI Control for Special Education", *ACM Transactions on Computer-Human Interaction,* 25(6), Article 35, pp. 1–33.

Porto Editora (2024) Escola Virtual. Available at: https://www.escolavirtual.pt/ (Accessed: 15 May 2026).

Saunders, M.N.K., Lewis, P. and Thornhill, A. (2023) Research methods for business students. 9th edn. Harlow: Pearson.

Sayal, K., Prasad, V., Beaven, A. and Coghill, D. (2018) "ADHD in children and young people: prevalence, care pathways, and service provision", The Lancet Psychiatry, 5(2), pp. 175–186.

Shneiderman, B. (2022) Human-Centered AI. Oxford: Oxford University Press.

Sweller, J., Ayres, P. and Kalyuga, S. (2011) *Cognitive Load Theory.* New York: Springer.