


Chapter 2

Universal Design for Learning and AI-Enhanced Assessment: Developing a Comprehensive Ontology for Equitable Evaluation

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ABSTRACT

This chapter examines the intersection of Universal Design for Learning (UDL) and AI-enhanced assessment to build a more inclusive and equitable evaluation framework in higher education. It critiques traditional assessment practices and explores how UDL principles—combined with AI functionalities such as adaptive assessment, automated feedback, and real-time analytics—can enhance flexibility and support diverse learners. Drawing from literature between 2017 and 2025, the chapter addresses issues such as algorithmic bias, institutional resistance, educator preparedness, and implementation in resource-constrained contexts. It offers a practical, research-informed model that guides policymakers, educators, and technologists in creating more equitable, student-centred assessment systems.

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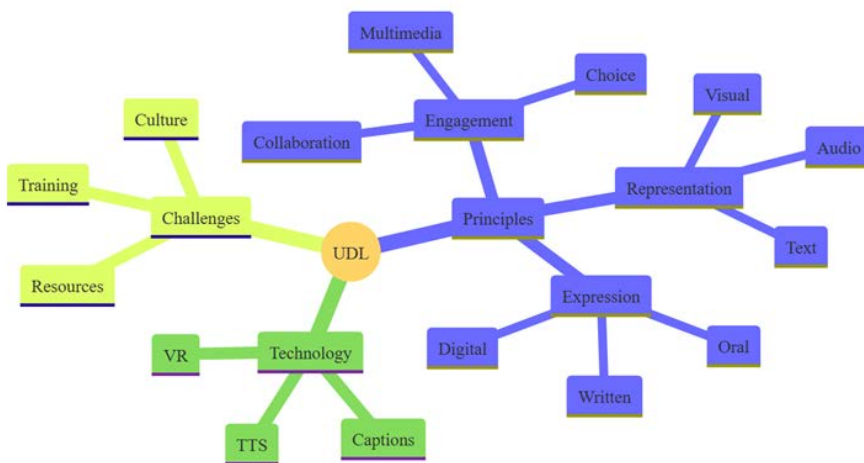
1. UNIVERSAL DESIGN FOR LEARNING (UDL)

1.1 Definition, Principles, and Historical Evolution

Universal Design for Learning (UDL) constitutes a framework grounded in robust evidence and insights derived from neuroscience, aimed at cultivating inclusive and adaptable educational settings for all learners (Denning, 2018; Kirsch & Luo, 2023). Rooted in the social model of disability, Universal Design for Learning (UDL) contests traditional instructional methods by acknowledging that barriers to learning frequently arise from environmental constraints rather than deficiencies in the learners themselves (Marcyk, 2015; Saborío-Taylor & Rojas-Ramírez, 2024a).

UDL is grounded in three core principles derived from neuroscience and mapped onto distinct neural networks:

Figure 1. The three UDL principles



AI-generated

- **Multiple Means of Engagement (Affective Network):** Supports motivation and student interest through choices, collaborative learning, and emotionally engaging content (Kasemsarn & Sawadsri, 2024).
- **Multiple Means of Representation (Recognition Network):** Promotes varied content delivery—text, visuals, audio—to suit diverse cognitive preferences (Anastasiou et al., 2024).

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