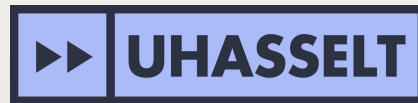




A SYSTEMATIC LITERATURE REVIEW on implemented UD strategies and their effectiveness today: What works in higher education?



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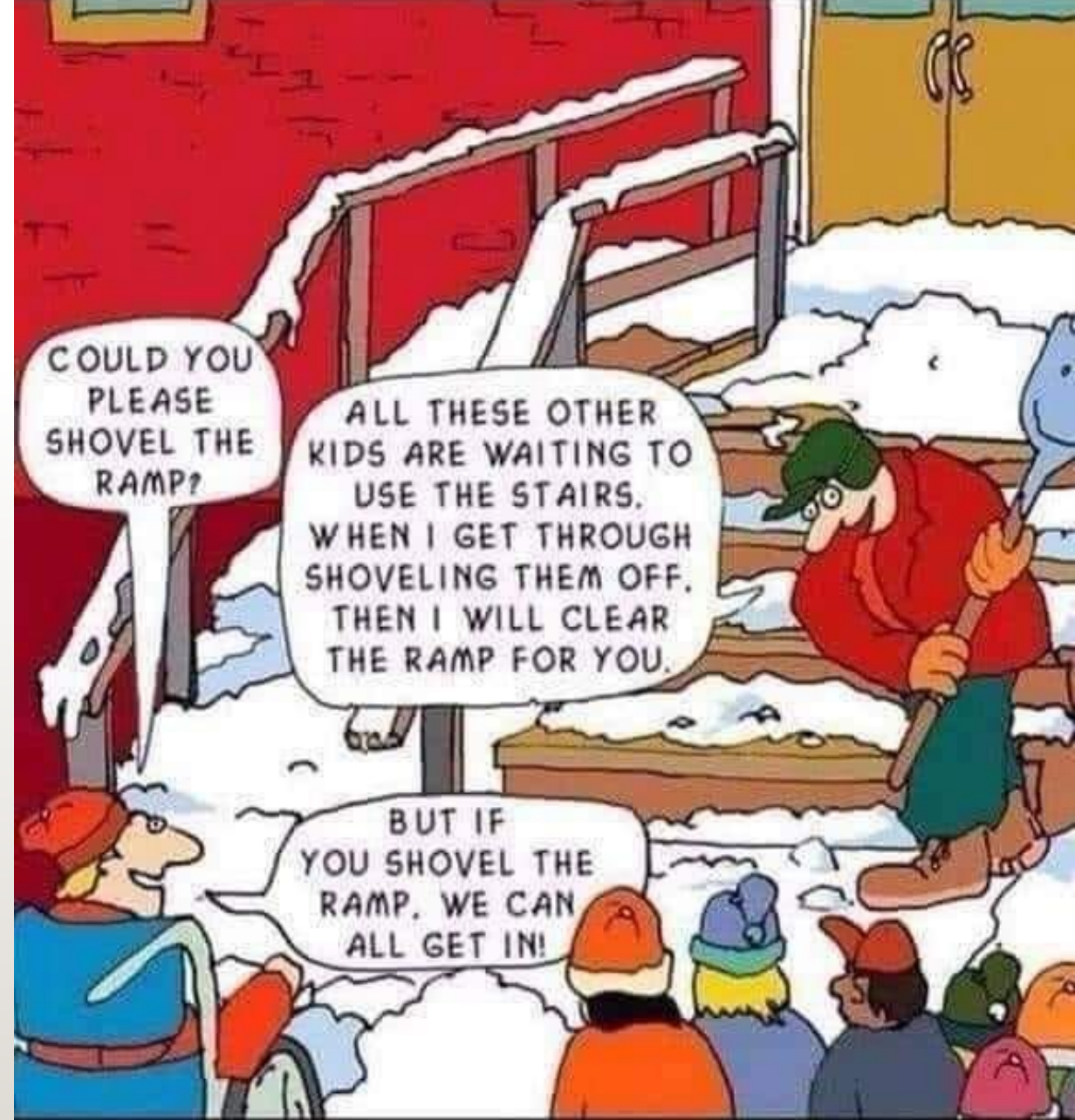
JURE 2024

**WHEN A FLOWER DOESN'T
BLOOM, WE FIX THE
ENVIRONMENT IN WHICH
IT GROWS,
not the flower.**



UNIVERSAL DESIGN (UD)

Clearing a path
for students with specific needs
clears the path for all students



THE 7 PRINCIPLES OF UD



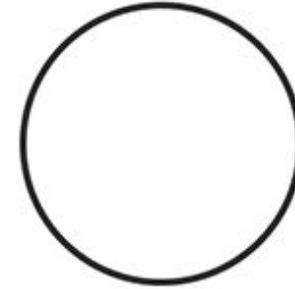
1. Equitable Use



2. Flexibility in Use



3. Simple and Intuitive Use



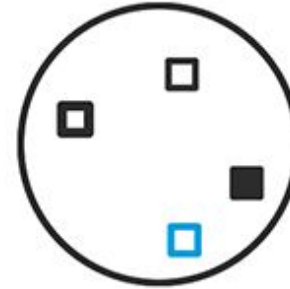
4. Perceptible Information



5. Tolerance for Error



6. Low Physical Effort



7. Size and Space for Approach and Use

UNIVERSAL DESIGN

UDL

UDI

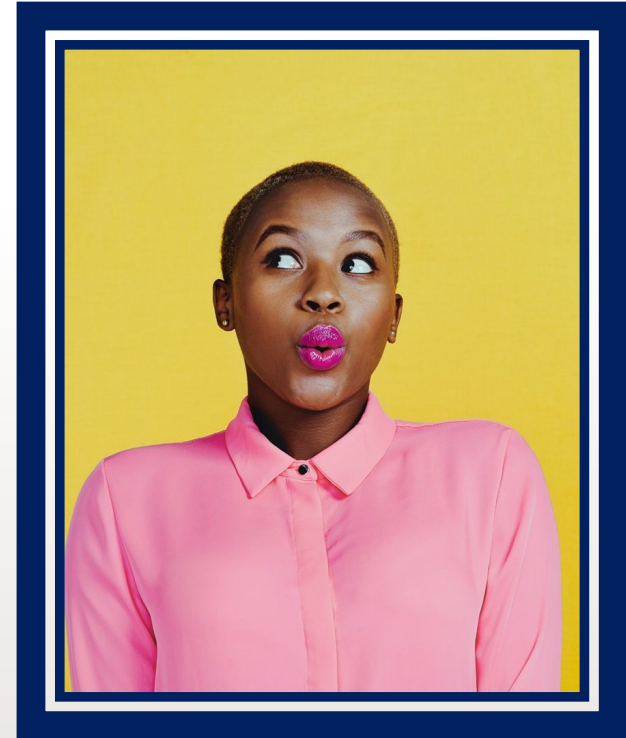
UID

UDA

UDT

GAP AND RELEVANCE

- Little empirical evidence in HE
- Wide variability in how UD is measured
- Focus on traditional accessibility
- Fragmentary and short-term evaluations



RESEARCH QUESTIONS

1. HOW IS UD APPLIED IN INCLUSIVE HIGHER EDUCATION?
2. WHICH OUTCOMES ARE LINKED TO WHICH UD- PRINCIPLES IN INCLUSIVE HIGHER EDUCATION?



SYSTEMATIC LITERATURE REVIEW

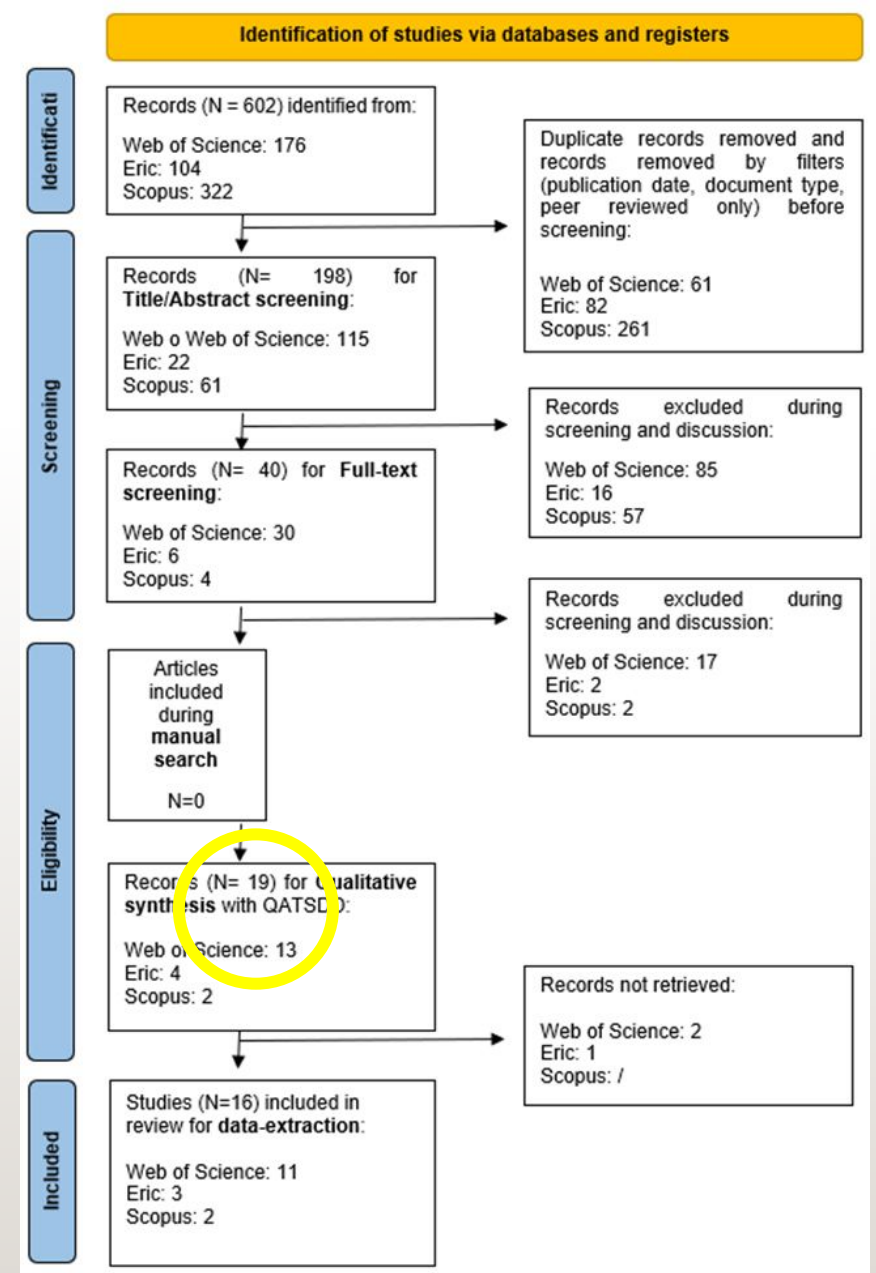
PRISMA checklist + statement (Page et al., 2021)

OSF Pre-registration: DOI:10.17605/OSF.IO/HQ8K7



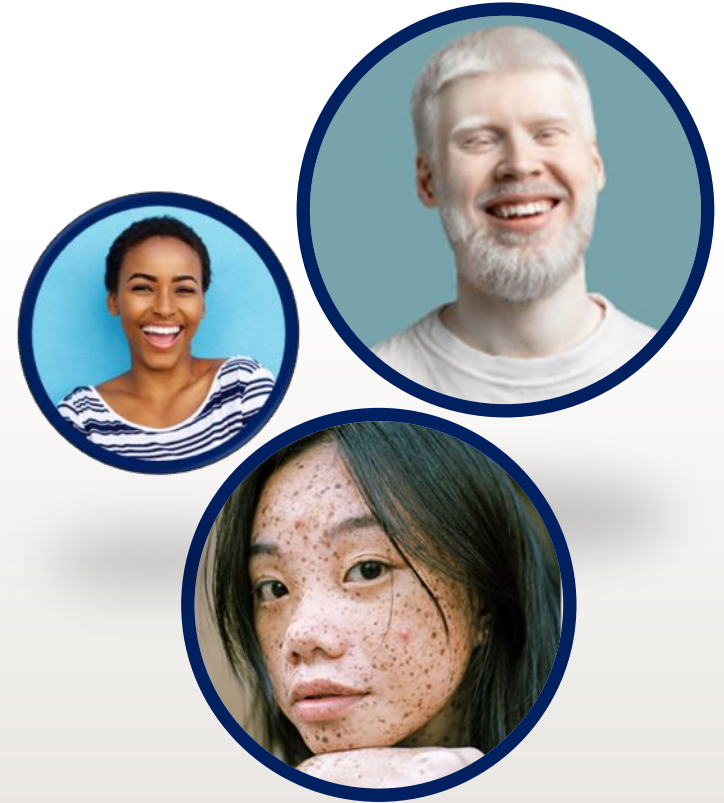
SELECTION PROCEDURE

- Databases: Web of Science, ERIC, Scopus
- Search string: UD, inclusive HE, outcomes, online LE
- Inclusion criteria:
 - Empirical studies and reviews 2013-2023
 - English or Dutch
 - Report on UD strategies and their effectiveness in online/offline HE.



DATA-ANALYSIS

- QATSDD for methodological quality check (Sirriyeh et al., 2012)
 - 16 articles remained
- Data-extraction by two independent reviewers
- Thematic analysis (Braun & Clarke, 2022) with NVIVO14
- Outcome: Narrative synthesis



UNIVERSAL DESIGN

UDL

UDI

UID

UDA

UDT



UDL

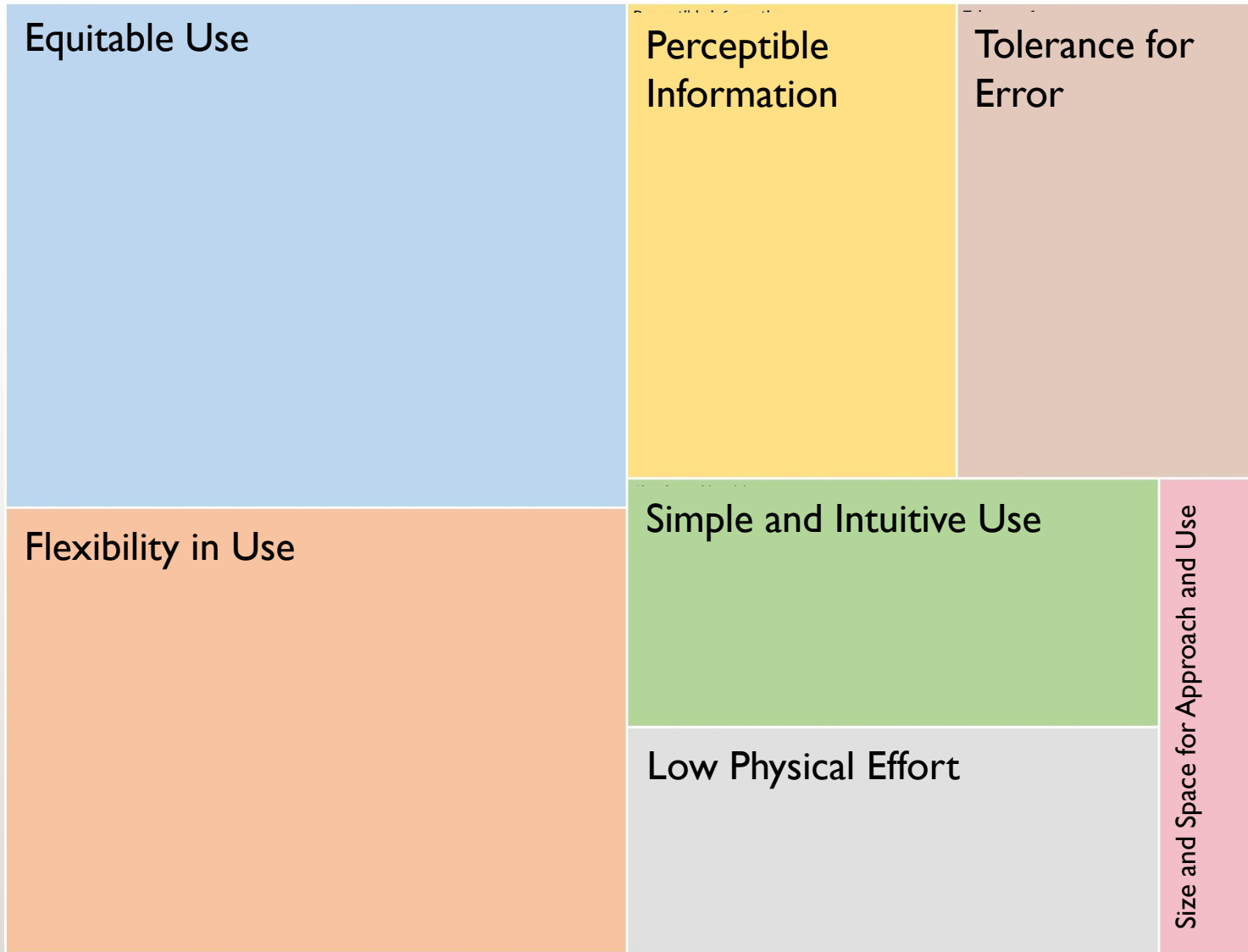
Multiple means of Representation

Multiple means of Engagement

Multiple means of Action and Expression

U D	Equitable use	Flexibility in use	Simple and intuitive use	Perceptible information	Tolerance for error	Low physical effort	Size and space for approach and use
U D L	Multiple means of representation	Multiple means of representation		Multiple means of representation			
	Multiple means of engagement	Multiple means of engagement	Multiple means of engagement				?
	Multiple means of action and expression	Multiple means of action and expression			Multiple means of action and expression	Multiple means of action and expression	

1. HOW IS UD APPLIED IN INCLUSIVE HIGHER EDUCATION?



UD compared by number of coding references

UD principle Applications/Strategies

Equitable use	<ul style="list-style-type: none"> - Diversity and flexibility in technical and pedagogical aspects of the learning environment - Differentiated instruction for various modes of content acquisition and comprehension - Variety and free choice in materials and tasks for weekly topics - Use of diverse instructional tools such as PowerPoint, clickers, etc. - Deployment of multiple media and multilingual transcripts and subtitles - Various engagement strategies such as online office hours and Twitter chats - Basic instructions through multiple channels and 1:1 support - Optimization of relevance, visibility of learning objectives, and UDL checkpoints - Involving students in co-designing materials and tasks - Use of accessible Learning Management Systems and interactive web tools - Freedom for students to choose tasks and engage in collaborative learning - Training of peer leaders and promotion of collaboration among students - Diverse options for students to demonstrate their knowledge and skills
Flexibility in use	<ul style="list-style-type: none"> - Need for simplicity and clarity in technical and pedagogical aspects of the learning environment - Use of user-friendly tools, clear instructions, and frequent feedback - Implementation of peer support and intuitive learning resources - Simple navigation and intuitive use of platforms such as Blackboard Collaborate - Clear instructions for participation in online activities - Basic instructions for the use of technological/online platforms and tools - Materials without unnecessary complexity - Use of clear language and structured organization of course materials - Frequent and differentiated feedback to clarify learning goals and expectations - Peer support within the learning environment for easy assistance - Defining clear (UDL) checkpoints and strategies for optimizing relevance - Designing podcasting with a simple and intuitive user interface
Simple and intuitive use	<ul style="list-style-type: none"> - Use of multimedia, multilingual transcripts, and subtitles for clear information delivery - Communication of information in multiple ways (visual, textual, auditory) - Co-designing assessments and programs for variation in information presentation - Use of podcasting as an auditory tool for accessible information - Adapting instructional and evaluation methods to accommodate different learning styles and needs - Use of clear language and structured organization of course materials - Use of visual representations such as graphs, diagrams, and visual organizers - Variation in presentation of course content through different instructional aids - Frequent, timely, differentiated, and specific feedback from teachers on tasks
Perceptible information	<ul style="list-style-type: none"> - Providing various ways for students to demonstrate their knowledge - Flexibility in evaluation criteria to allow for different approaches - Integration of interactive web tools and practical examples in videos - Offering multiple modes of interaction such as online quizzes - Use of podcasting for review and additional explanation - Allowing for mistakes and experimentation in the learning process - Supporting teachers in creating a tolerance for errors - Encouraging a culture where mistakes are seen as valuable learning opportunities
Tolerance for error	<ul style="list-style-type: none"> - Use of digital and accessible learning management systems (LMS) - Offering online office hours, Twitter chats, and virtual classroom environments - Flexibility in evaluation criteria to reduce physical strain - Use of technological tools such as voice-activated technologies - Minimizing physical effort by using smart speakers - Use of software to access learning content without physically operating a screen
Low physical effort	<ul style="list-style-type: none"> - Use of asynchronous discussion forums and courses for flexible and accessible interaction - Providing space for students to participate in discussions at their own pace - Making materials and instruction accessible to all students, regardless of their physical location - Use of multiple interactive web tools for participation without physical barriers - Providing online one-on-one support to individual students - Ability for students to ask questions and receive assistance remotely
Size and space for approach and use	

UD in practice

Note. The core concepts in this table illustrate the practical application of Universal Design (UD) principles within higher education. These concepts serve as guidelines for promoting inclusivity and accessibility in learning environments, accommodating diverse needs and learning styles of students.

UD outcomes
linked to UD
principles

	Equitable Use	Flexibility in Use	Simple and Intuitive Use	Perceptible Information	Tolerance for Error	Low Physical Effort	Size and Space for Use and Approach
	X	X		X			
Improved understanding of course content - Improved academic performance (higher grade point average) - Increased control over learning experience							
	X	X	X				
More connection to the subject matter - Increased motivation - Gained more opportunities to deepen their learning - Reinforcement of skills - Improved understanding of topics covered - Effective interaction between students and teachers - Building strong relationships between students and teachers - Positive preparation for future practices and roles							
	X	X				X	X
Increased interest and motivation - Perception of flexibility - Positive perception of the learning process - Possibility of better representation of knowledge - Increased self-confidence and motivation - Contribution to professional development students+teachers - Reduction of pressure for teachers - Stimulation of innovative thinking and design							
	X	X	X	X	X	X	(X)
Increased engagement in the learning process - Increased active participation in the learning process - Increased sense of autonomy through more choice and creativity in their assignments - Competence perception through materials tailored to skills and preferences - Increased equality in need fulfilment - Challenges in developing social and emotional connectedness, especially in digital learning environments - Better organization and focus through checkpoints, goals, reflection on deadlines, self-evaluation - Difficulties in providing diverse representation options such as textual information and identifying patterns - Improved cognitive skills of students, demonstrated by higher scores on listening and reading comprehension tests - Increased collaboration and sense of being a co-creator of knowledge - Increased inclusiveness and adaptability of the learning environment - Increased student appreciation for a variety of learning styles and strategies, such as game-based activities, audiovisual resources, and collaborative opportunities - Potential of inclusive assessment to reduce anxiety - Improved self-efficacy through inclusive assessment practices - Improved student learning outcomes through inclusive assessment							

2. WHICH OUTCOMES ARE LINKED TO WHICH UD- PRINCIPLES IN INCLUSIVE HIGHER EDUCATION?

- Positive effects on
 - Academic performance
 - Student engagement and autonomy
- Deepening learning processes, innovative thinking and professional development
- Challenges in (online) learning environments
 - Social connectedness
 - Expansion of presentation options



Key message



Holistic design approach

- Simultaneous implementation of UD principles
- Strengthening accessibility and involvement
- Teachers also experience benefits

Technology matters

- Little attention to barriers in the physical space

Limitations

Geographical and cultural contexts

Linguistic bias

Inclusion criteria



Policy recommendations

- Guidelines on inclusive pedagogies and technologies
 - Integrate UD as a core component.
- Continuous UD evaluation and optimization
- Teacher support
 - Culture of cooperation, support and sharing
- Encourage the development of inclusive online learning environments
 - Mind the digital gap and higher costs
- Involve students in designing UD strategies



THANK YOU

Building an inclusive future together?

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REFERENCES

Braun, V., & Clarke, V. (2022). *Thematic Analysis: A practical guide*. Sage Publications.

Burgstahler, S. (2011). Universal Design: Implications for Computing Education. *ACM Transactions on Computing Education*, 11(3), 19.

<https://doi.org/10.1145/2037276.2037283>

Burgstahler, S. (2012). *Universal Design: Process, Principles, and Applications | DO-IT*.

<https://www.washington.edu/doit/universal-design-process-principles-and-applications>

Burgstahler, S. (2013). *Universal Design in Higher Education: Promising Practices*. DO-IT, University of Washington.

<https://www.washington.edu/doit/resources/books/universal-design-higher-education-promising-practices>

Edyburn, D. L. (2010). Would You Recognize Universal Design for Learning if You Saw it? Ten Propositions for New Directions for the Second Decade of UDL. *Learning Disability Quarterly*, 33(1), 33–41. <https://doi.org/10.1177/073194871003300103>

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ...

Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, n71. <https://doi.org/10.1136/bmj.n71>

Rao, K., Ok, M. W., & Bryant, B. R. (2014). A Review of Research on Universal Design Educational Models. *Remedial and Special Education*, 35(3), 153–166.

<https://doi.org/10.1177/0741932513518980>

