



Fakultät für  
**Psychologie**

# Barrier-free Digital Teaching

Introduction to barrier-free digital  
teaching

Faculty of **Psychology**

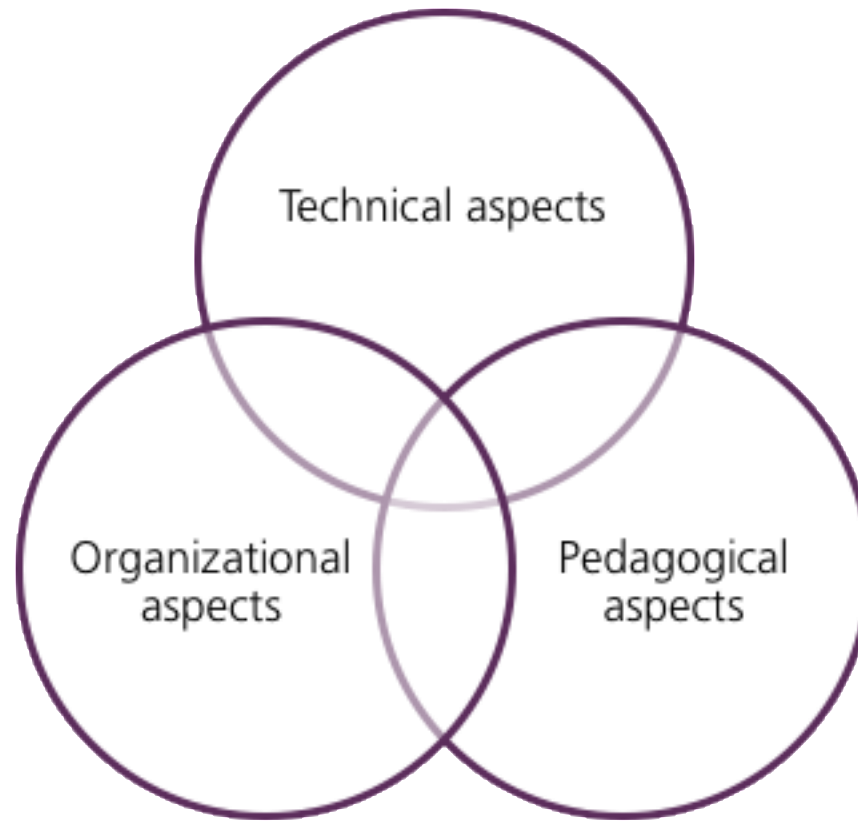
Dr. Björn Fisseler

## Dr. Björn Fisseler

- Current:
  - FernUniversität in Hagen
  - Educational Technology Specialist
- Research topics
  - Accessibility
  - Students with disabilities in higher education
  - Inclusive pedagogy and didactics
  - AI in education



## What I will talk about: barrier-free digital teaching and learning



# Technical aspects

## Barrier-free means...

...to design and provide web content, tools and technology in such a ways that people with disabilities can use them, if necessary with assistive technologies.

## How people use ICT



Source: <https://globalaccessibilitynews.com/2013/04/26/mouthstick-stylus-makes-touchscreen-devices-accessible-for-people-with-disabilities/>

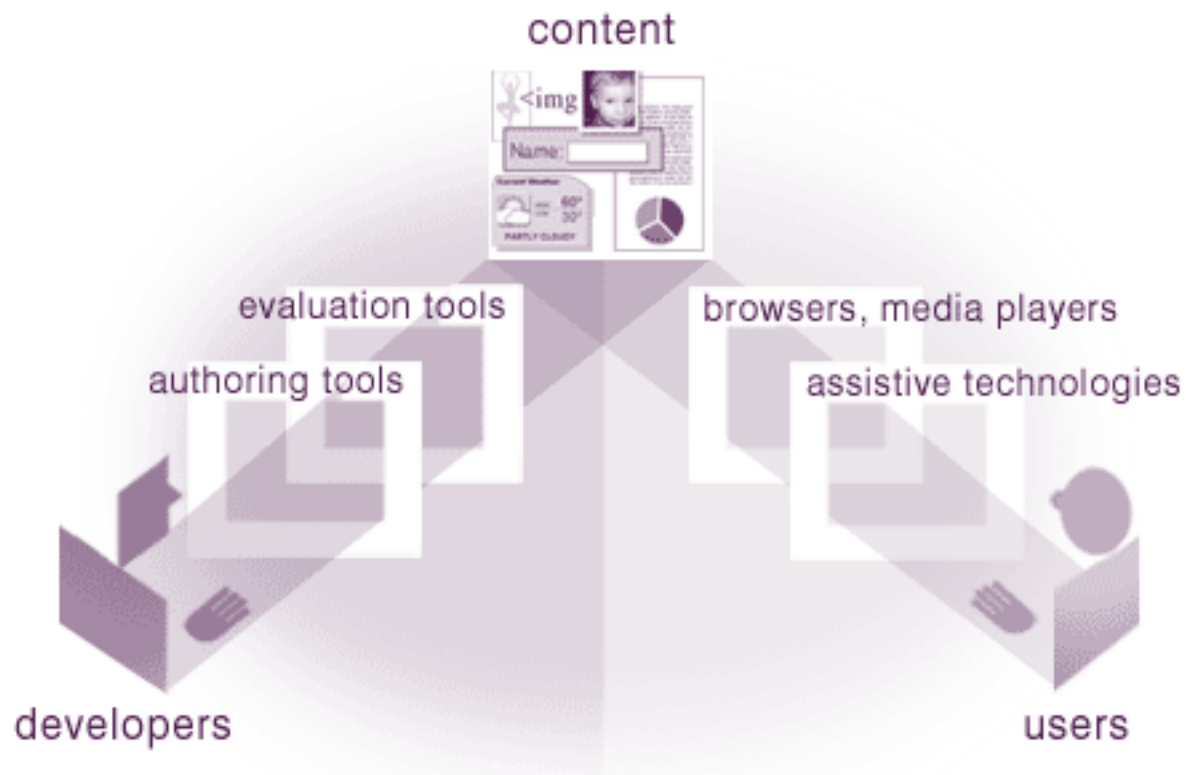


Source: <https://www.ucf.edu/news/unless-know-someones-disability-story-dont-compliment-inspirational/>

## How people with disabilities use ICT



# Components of Web Accessibility



Source: <https://www.w3.org/WAI/fundamentals/components/>



## Laws and standards

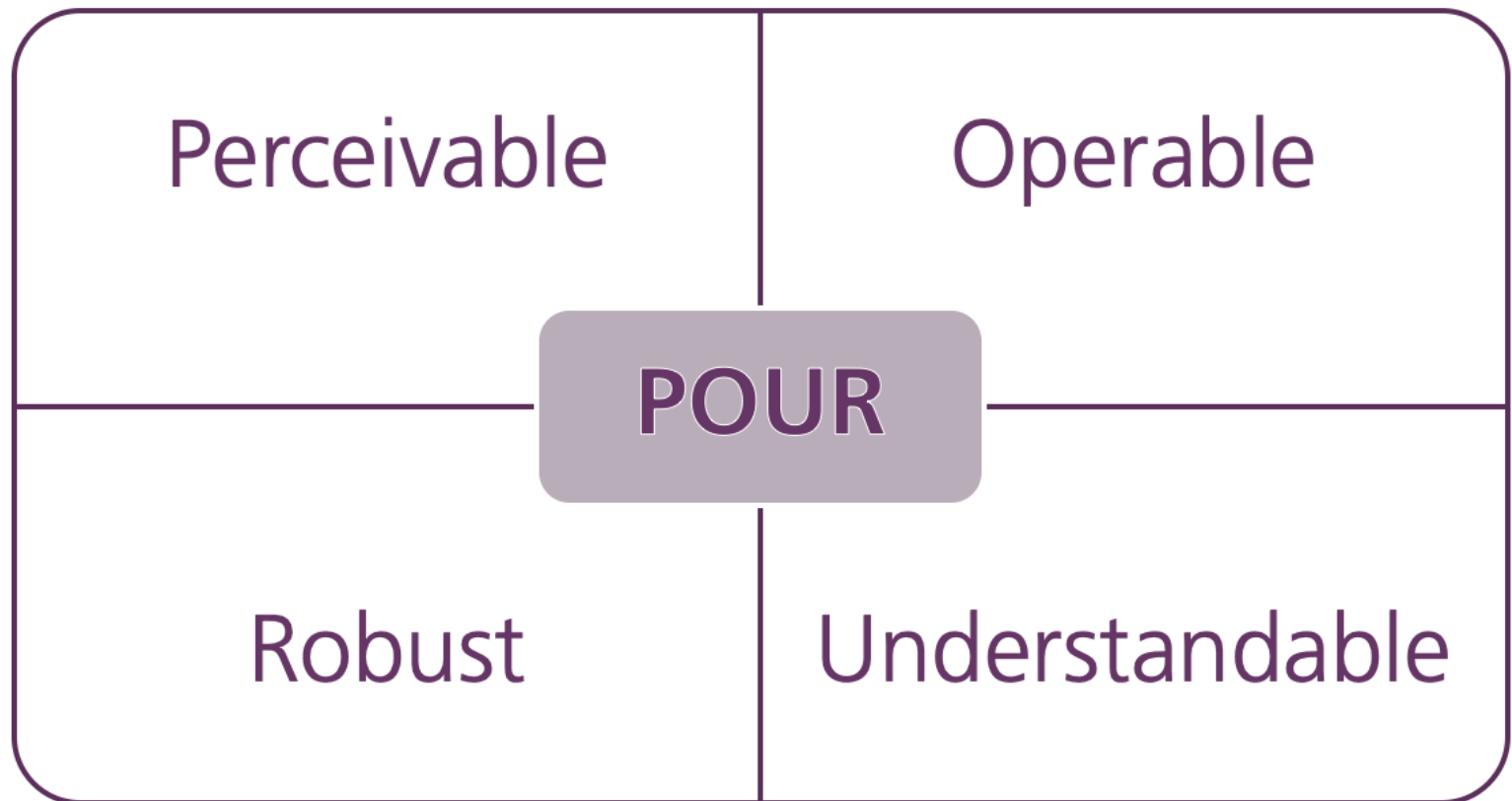
### Standards

- Harmonised EU Standard EN 301 549, refers to the
- Web Content Accessibility Guidelines 2.1 (2.2 is upcoming)
- Authoring Tool Accessibility Guidelines (ATAG)
- User Agent Accessibility Guidelines (UAAG)
- WebVTT
- ...

### Laws (examples only, check for your country)

- USA
  - Rehabilitation Act of 1973 (Section 504 and 508)
  - Americans with Disabilities Act (ADA)
- Europe
  - European Accessibility Act
  - EU Directive 2016/2102

## Core Concept of Accessibility



## POUR – P & O

### Perceivable

Available to the senses, either through the browser or through AT.

- Text alternatives for non-text content
- Captions and other alternatives for multimedia
- Content can be presented in different ways
- Content is easier to see and hear

### Operable

Users can interact with all controls and interactive elements using either the mouse, keyboard, or an assistive device.

- Functionality is available from a keyboard
- Users have enough time to read and use the content
- Users can easily navigate, find content, and determine where they are
- Users can use different input modalities beyond keyboard...

## POUR – U & R

### Understandable

Content is clear and limits confusion and ambiguity.

- Users can use different input modalities beyond keyboard
- Content appears and operates in predictable ways
- Users are helped to avoid and correct mistakes

### Robust

A wide range of technologies (including old and new user agents and assistive technologies) can access the content.

- Content is compatible with current and future user tools
- Operating systems
- Browsers und other software
- Assistive Technologies

## Accessibility benefits...

...when using mobile devices, smart devices, devices with small screens or specific modes of operation.

...older people, when their physical or cognitive abilities change.

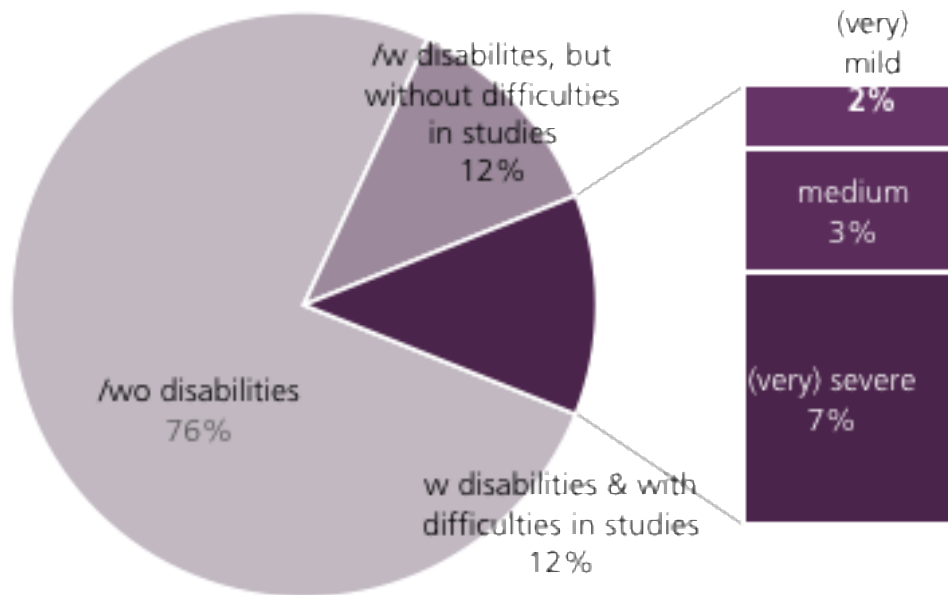
...people with temporary impairments like a broken arm or forgotten eyeglasses.

...people with situative impairments like bright sunlight or sound-sensitive environments.

...people with slow internet connections or limited bandwidth.

...basically anybody anytime anyhow.

## Students with disabilities, in Germany



Source: 21. Sozialerhebung, 2016; own creation

**Bild 3.13 Form der gesundheitlichen Beeinträchtigung<sup>1</sup> nach Geschlecht studienerschwerend Beeinträchtigte in %**

Form der Beeinträchtigung	insg.	Geschlecht	
		männl.	weibl.
psychische Erkrankung	47	43	50
chronisch-somatische Erkrankung	18	17	20
Mehrfachbeeinträchtigung <sup>2</sup>	6	6	6
andere Beeinträchtigung	5	7	4
Mobilitätsbeeinträchtigung	4	4	4
Teilleistungsstörung	4	5	3
Sehbeeinträchtigung/Blindheit	2	3	2
Hörbeeinträchtigung/Gehörlosigkeit	2	2	2
Sprach-/Sprechbeeinträchtigung	1	1	<1
möchte Beeinträchtigung nicht nennen	11	12	9
<b>insgesamt</b>	<b>100</b>	<b>100</b>	<b>100</b>

Source: 21. Sozialerhebung, 2016

## AHEAD Covid-19 Transition Survey

- 56% of survey participants reported difficulty for students with disabilities receiving previously approved accommodations
- 79%: SwD difficulties possessing needed equipment and devices
- 72%: SwD don't receive the technology support and/or training
- 58%: SwD cannot access or don't receive academic support and tutoring
- 61%: SwD cannot access counseling and mental health services
- 75%: SwD have difficulties communicating with their course instructors

Quelle: <https://www.ahead.org/professional-resources/coronavirus-resources>

## ECAR Study of Technology Needs of SwD, 2020

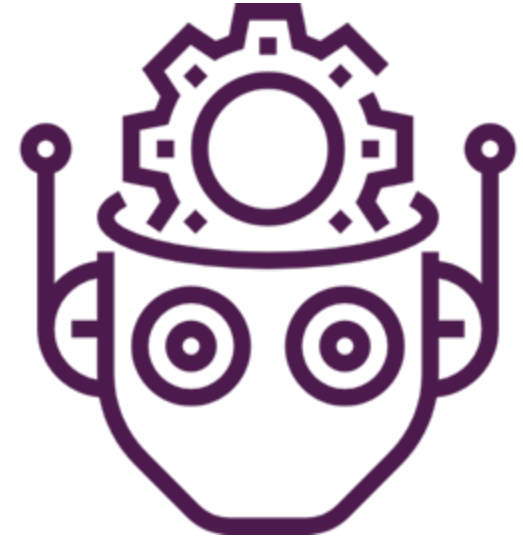
- Students want their instructors to make all course materials and resources accessible online.
- The learning management system (LMS) is considered key to providing access for students with disabilities to online course content, and they would like faculty to use it more.
- Students want to use their mobile devices in the classroom to take notes.
- Students want training for themselves and their instructors on how to use the technology on their campus and for their classes.
- Greater use of videos or other media in the classroom and online can benefit students with disabilities by presenting course materials in multiple formats.
- Assistive/accessible technology such as captioning and text-to-speech software is important to their academic success, and students with disabilities would like instructors to account for this when developing their courses.

Source: <https://www.educause.edu/ecar/research-publications/ecar-study-of-the-technology-needs-of-students-with-disabilities/2020/introduction-and-key-findings>



## AI in Higher Education

- Automatic captioning and translation
- Automatic alternative texts and descriptions
- Automatic provision of alternate media
  
- Learning Analytics
- Personalised learning and adaptive learning environments
- Chatbots and recommender systems
- AI tutoring
  
- Risk of Technoableism (Shew, 2020)



# Pedagogical aspects

What inclusive barrier-free digital teaching & learning can look like

## In inclusive barrier-free digital teaching, everyone

- Who meets the requirements, with or without accommodations, is encouraged to participate
- Feels welcome
- Is fully engaged in accessible and inclusive activities

(Source: Burgstahler, 2020)

## What is „Universal Design“?

Universal Design...

„means the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design. ‚Universal design‘ shall not exclude assistive devices for particular groups of persons with disabilities where this is needed.“

(UN-CRPD, Article 2)


## History of Universal Design

- 1960s
  - 1964: Civil Rights Act
  - 1968: Architectural Barriers Act
  - Barrier-free Bewegung
  - Behindertenrechtsbewegung
- 1970s
  - 1973: Section 504 of Rehabilitation Act
  - 1975: Education for Handicapped Children Act
  - 1977: Michael Bednar's initial idea of Universal Design
- 1980s
  - 1985: Ron Mace coins the term „Universal Design“
  - 1986: Air Carrier Access Act
  - 1988: Fair Housing Amendments Act
- 1990s
  - 1990: Americans with Disabilities Act (ADA)
  - 1996: Telecommunications Act
  - 1997: IDEA
  - 1997: Developing the 7 Principles of Universal Design
  - 1998: Section 508

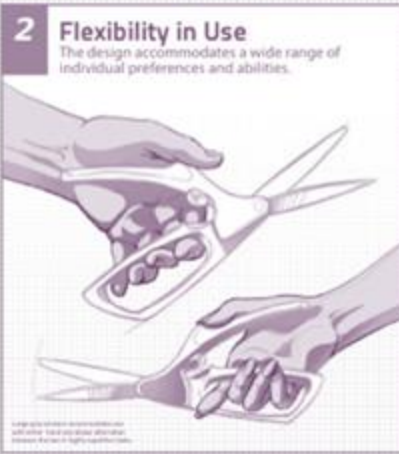
# The Principles of Universal Design

The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.


**1 Equitable Use**  
The design is useful and marketable to people with diverse abilities.




**2 Flexibility in Use**  
The design accommodates a wide range of individual preferences and abilities.



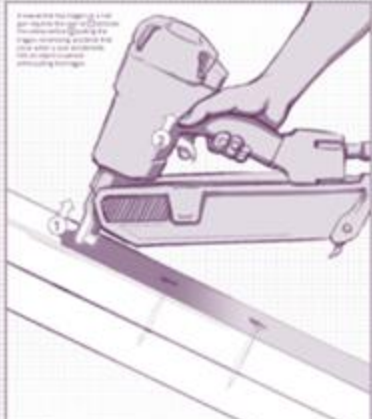
**3 Simple and Intuitive Use**  
Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or education level.




**4 Perceptible Information**  
The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.




**5 Tolerance for Error**  
The design minimizes hazards and the adverse consequences of accidental or unintended actions.

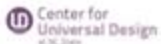


**6 Low Physical Effort**  
The design can be used efficiently and comfortably and with a minimum of fatigue.



**7 Size and Space for Approach and Use**  
Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.



 Center for Universal Design  
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 Phone: +49 340 319-1000  
 Email: [ud@fernuni-hagen.de](mailto:ud@fernuni-hagen.de)

## Approaches to Universal Design in Educational Settings

- Universal Design of/for Instruction: Scott et al., 2003
- Universal Instructional Design: Silver et al., 1998
- Universal Design for Learning: Rose, Meyer, 2002
- Universal Design of Education: Bowe, 2000
- Universal Course Design: Behling, Hart, 2008
- Universal Design University: Powell, 2012

## Three principles of Universal Design for Learning

Provide multiple means of

- Engagement: affective networks, the „why“ of learning
- Representation: recognition networks, the „what“ of learning
- Action and Expression: strategic networks, the „how“ of learning

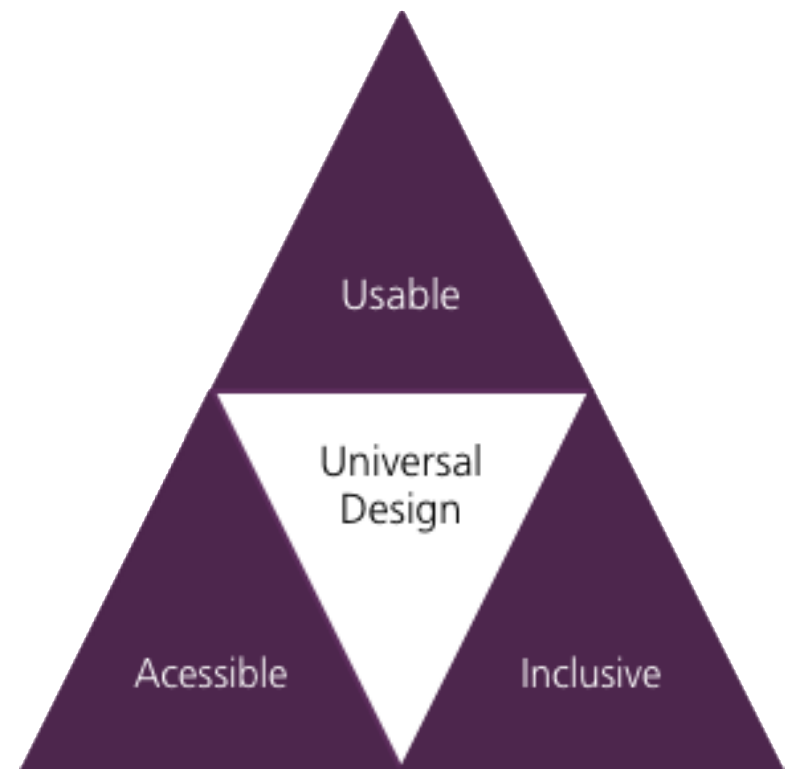
Provide multiple ways to

- Learn
- Interact
- Demonstrate learning



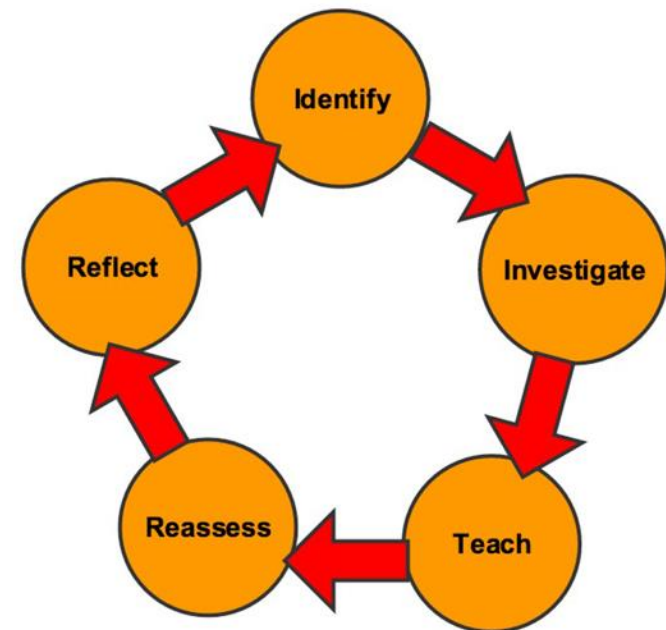
## Universal Design

- Is a goal
- Is a proactive process
- Is accessible, usable, and inclusive
- Values academic quality and academic standards



## Implement Universal Design in your teaching

- Reflect on the needs of your students. "What are my students struggling with?"
- Identify a principle or checkpoint that addresses that need. "How might I use this checkpoint to meet the needs of my learners?"
- Investigate and create new methods or strategies. "What brings this principle or checkpoint to life?"
- Teach a lesson using the new method or strategy. "What does this principle or checkpoint look like in my teaching environment?"
- Assess the new method or strategy. "In what ways did my students demonstrate knowledge or skills?"
- Reflect on how the new method or strategy worked. "How did the principle or checkpoint enhance my students' outcomes?"

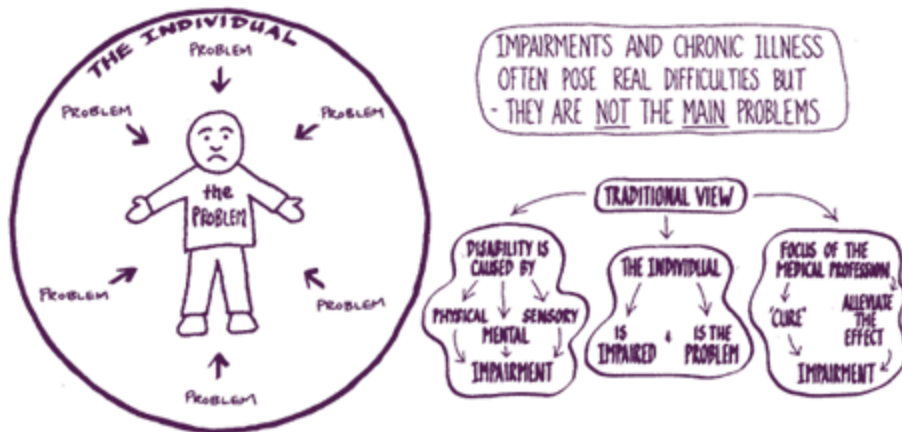


Source: Nelson, L. L. (2014) Design and deliver: Planning and teaching using universal design for learning.

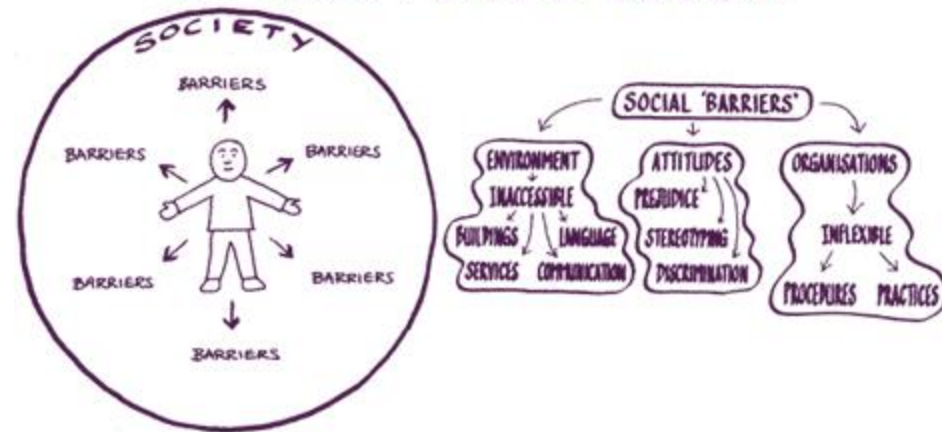
# Organizational aspects

# Models and frameworks

## THE MEDICAL MODEL OF DISABILITY



## THE SOCIAL MODEL OF DISABILITY



## Ed-ICT Project Takeaways



- Question your models and frameworks
- Involve various stakeholders
- Question your practice
- Develop solutions together

## Recommendations from ECAR Study

### Higher education institution

- Educate faculty on technology barriers
- Provide an accessible LMS as key access feature
- Advise instructors in course development to keep accessibility in mind
- Improve faculty skills in using mobile tech
- Train students and faculty on how best to use the technology

### Faculty

- Adopt new habits in the development of course content to make online materials more accessible
- Leverage the institutionally provided LMS
- Make course materials more accessible by creating different formats, “plus one” approach
- Use multiple means such as video, visuals, and multimedia to present information
- Increase student engagement by incorporating the use of in-class tech

## Involve your stakeholders



IT-Experts



Students



External Stakeholders



Lecturers / Faculty



Management



Administration



Faculty development

Quelle: <https://www.flaticon.com>

## Question your own practice



Quelle: <https://www.flaticon.com>



## Training and qualification

- Topics
  - Basics of accessibility
  - Implementing accessibility
  - Students with and without disabilities
  - Assistive Technology
  - Testing for accessibility
  - Inklusionsorientierte Hochschuldidaktik
  - ...
- Who needs what training and qualification?
- And in which format?

## Accessibility info portals (I)

<https://www.washington.edu/accessibility/>



The screenshot shows the top navigation bar of the University of Washington website with a purple background. It includes the UW logo, navigation links for 'ABOUT', 'ACADEMICS', 'APPLY', 'NEWS & EVENTS', 'RESEARCH', 'CAMPUSES', and 'GIVE', and a search icon. Below the navigation is a banner image of a Gothic building with the text 'Accessible Technology'. The main content area features the heading 'Accessible Technology at the UW' and a sub-heading 'Experiencing inaccessible IT? Please let us know.' followed by a paragraph of text. To the right is a sidebar titled 'ACCESSIBLE TECHNOLOGY' with links for 'UW Policy', 'IT Accessibility Guidelines', 'IT Accessibility Checklist & Tutorial', and 'IT Accessibility Leadership'.

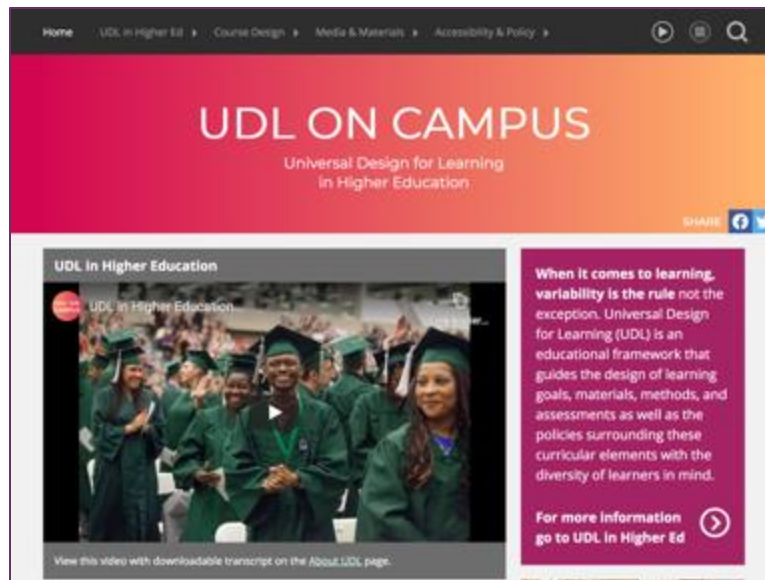
<https://accessibility.psu.edu/>



The screenshot shows the Penn State Accessibility website. The header includes the Penn State logo and the text 'PennState Accessibility' and 'Accessibility and Usability at Penn State'. A dark navigation bar contains links for 'Home', 'Accommodations', 'Blockers', 'Courses', 'Websites', 'Multimedia', 'Testing/Triage', 'Software', and 'Training'. Below the navigation is a 'Home' section with a paragraph explaining the site's purpose and a link to 'Penn State IT Service Desk'. A 'Get Started' section follows, with sub-sections for 'Accommodations', 'Blockers', 'Courses', 'Guidelines', and 'Websites'. To the right is a blue graphic with three circles and the text 'AND'. A small caption below the graphic reads 'The Braille sign above is the symbol for the'.

## Accessibility info portals (II)

<http://udloncampus.cast.org/home>

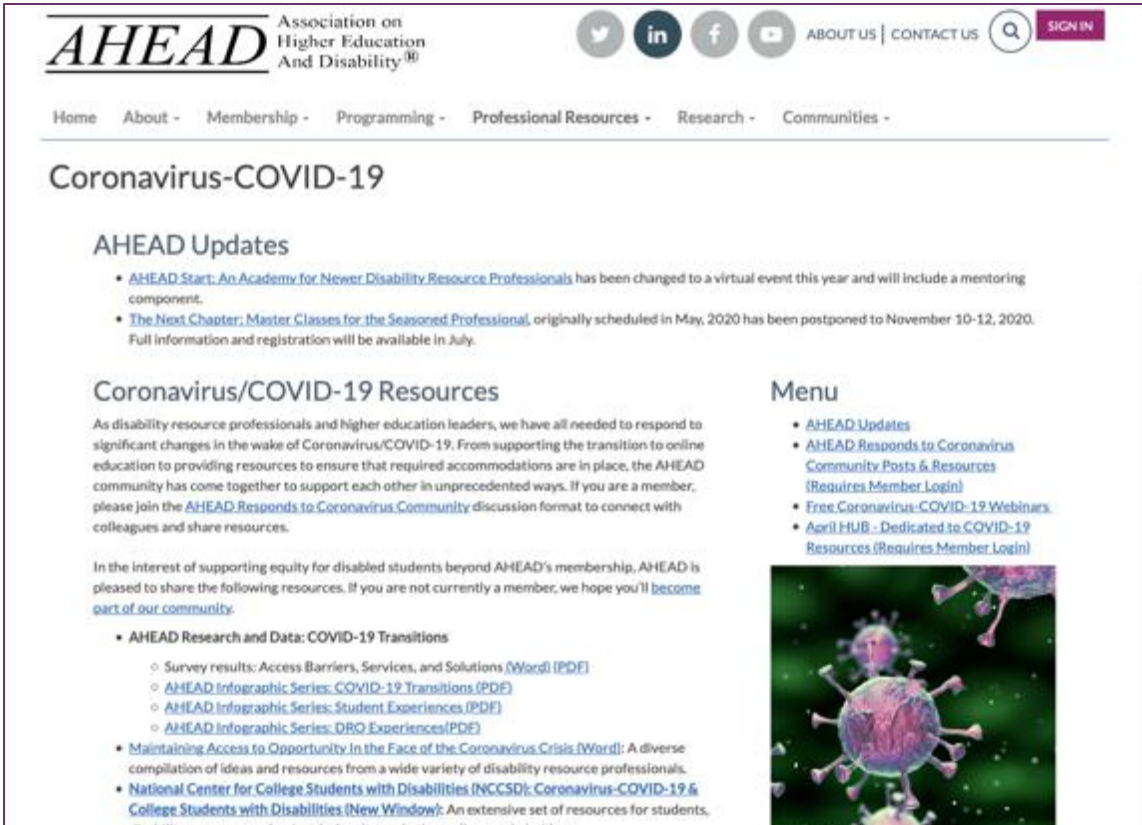


<https://www.csun.edu/universal-design-center>



# AHEAD Covid-19 Resources

<https://www.ahead.org/professional-resources/coronavirus-resources>



The screenshot shows the AHEAD website's 'Coronavirus-COVID-19' page. The header includes the AHEAD logo (Association on Higher Education And Disability), social media icons for Twitter, LinkedIn, Facebook, and YouTube, and navigation links for 'ABOUT US' and 'CONTACT US'. A 'SIGN IN' button is also present. Below the header is a main navigation menu with links for Home, About, Membership, Programming, Professional Resources, Research, and Communities. The main content area is titled 'Coronavirus-COVID-19' and features a section for 'AHEAD Updates' with two bullet points: one about 'AHEAD Start: An Academy for Newer Disability Resource Professionals' being changed to a virtual event, and another about 'The Next Chapter: Master Classes for the Seasoned Professional' being postponed to November 2020. Below this is a section for 'Coronavirus/COVID-19 Resources' with a paragraph explaining the community's response and a list of resources including survey results, infographics, and a compilation of ideas. To the right is a 'Menu' section with links to updates, community posts, webinars, and a dedicated HUB. At the bottom right, there is a decorative image of a coronavirus particle.

# The Accessibility Iceberg

## Technological Level

Course accessibility

Accessible Media & Content

Inclusive learning activities

Utilizing Technology

Course Planning

Attitudes

Infrastructure

## Cultural & Institutional Level

Higher-Education Didactics

Engagement