



# **Automatic accessibility checks on online courses**

Supporting teachers in getting their homework done

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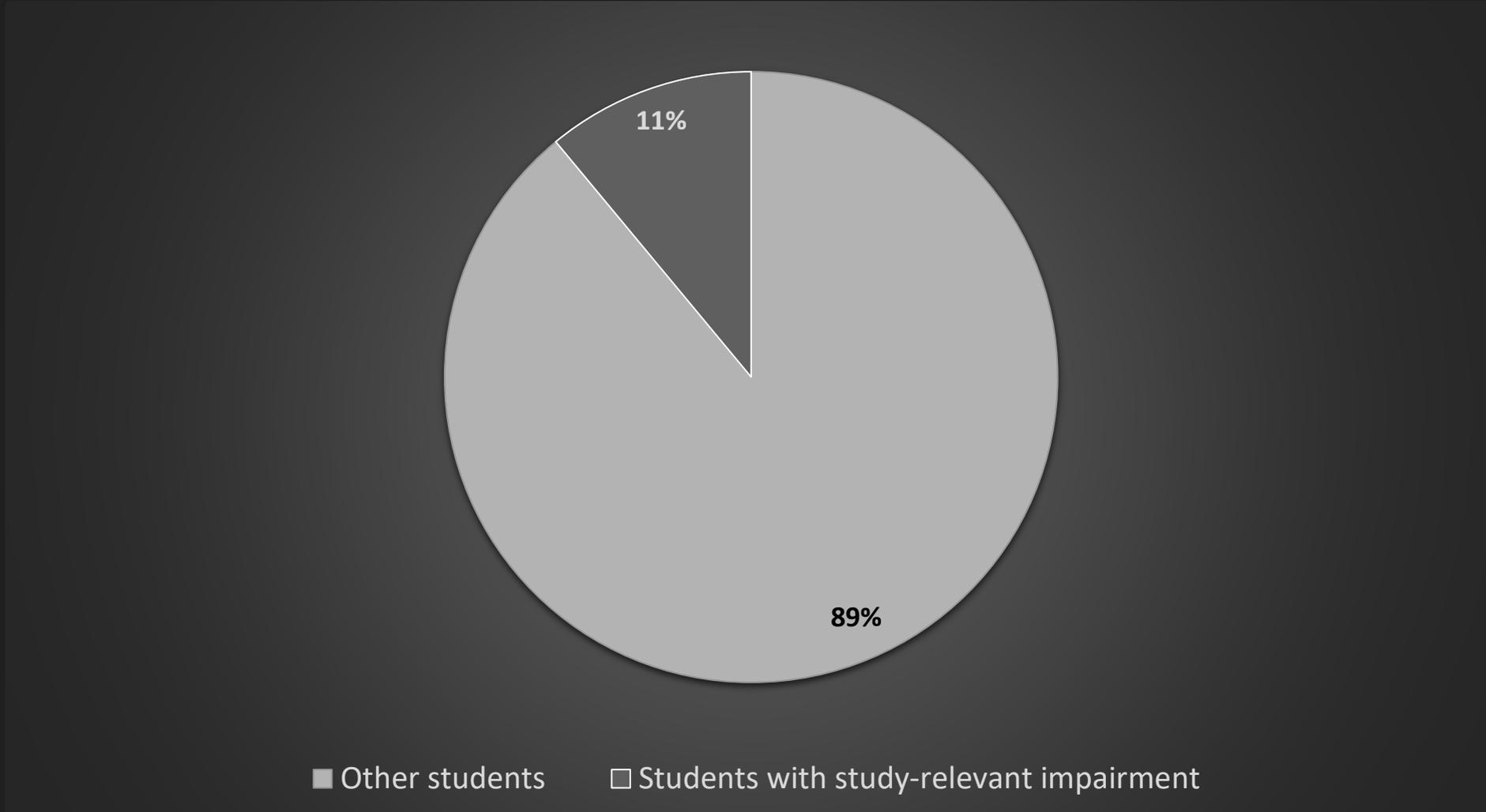
# Competence Center on Digital Accessibility

## Current situation

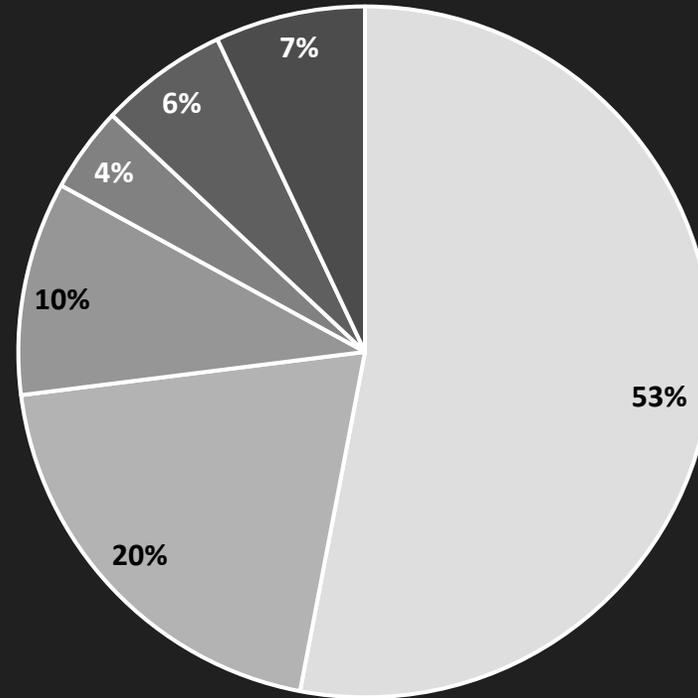
- Team of 7 persons (as of today)
- Strategy: Support universities to become proficient in digital accessibility
- Services: Consulting and checking of websites / documents / mobile apps
- Webinars, Newsletter
- URL: <https://barrierefreiheit.hdm-stuttgart.de/>



# “Students with Impairment” in Germany



# Study-Relevant Impairments



■ Mental

■ Motion and sensory perception

■ Other impairment

■ Chronically somatic

■ Dylexia, dyscalcula, etc.

■ Multiple impairments of equal degree

# “Side Effects” of Digital Accessibility

- Accessible Design is good design **for all**
- Better learning **for all**
- Competencies in digital accessibility for students
- Legally correct

# Research Project SHUFFLE

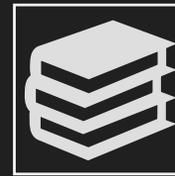


**SHUFFLE**  
= “Higher Education Initiative  
Digital Accessibility for All”



**Development and evaluation  
of digital accessibility  
measures in HE**

Aug 2021 – July 2024



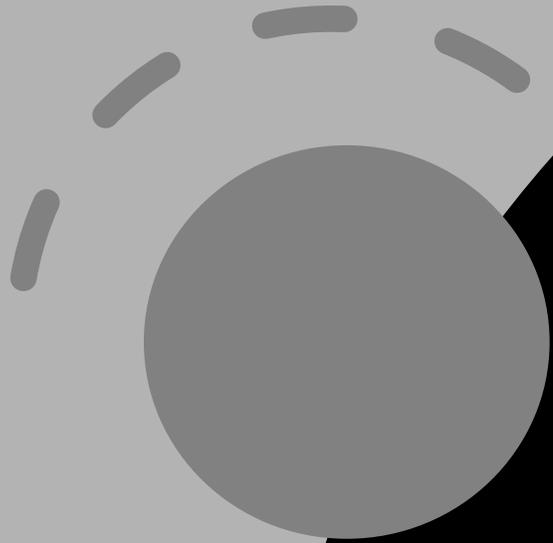
**Cooperation partners**

Stuttgart Media University  
Bielefeld University  
Heidelberg University of Education  
Freiburg University of Education



**Funding from “Stiftung  
Innovation in der  
Hochschullehre”**

3 Mill. €, 11 FTE



# 12 Measures for Digital Inclusion in Higher Education

SHUFFLE Makes It Work



# Accessible learning materials

- Slides
- Scripts
- Learning Management System (Moodle, ILIAS, etc.)
- Students as e-tutors
- **Accessible docs benefit all students!**

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# Video Recordings

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- Make up for a missed lecture
- Rehearse for exam
- Replay in any speed
- **Video recordings benefit all students!**





## Verbal Descriptions (a.k.a. audio descriptions)

- Describe diagrams and screenshots as part of the presentation
- **All students benefit from good explanations!**



## Live Captions & Translation

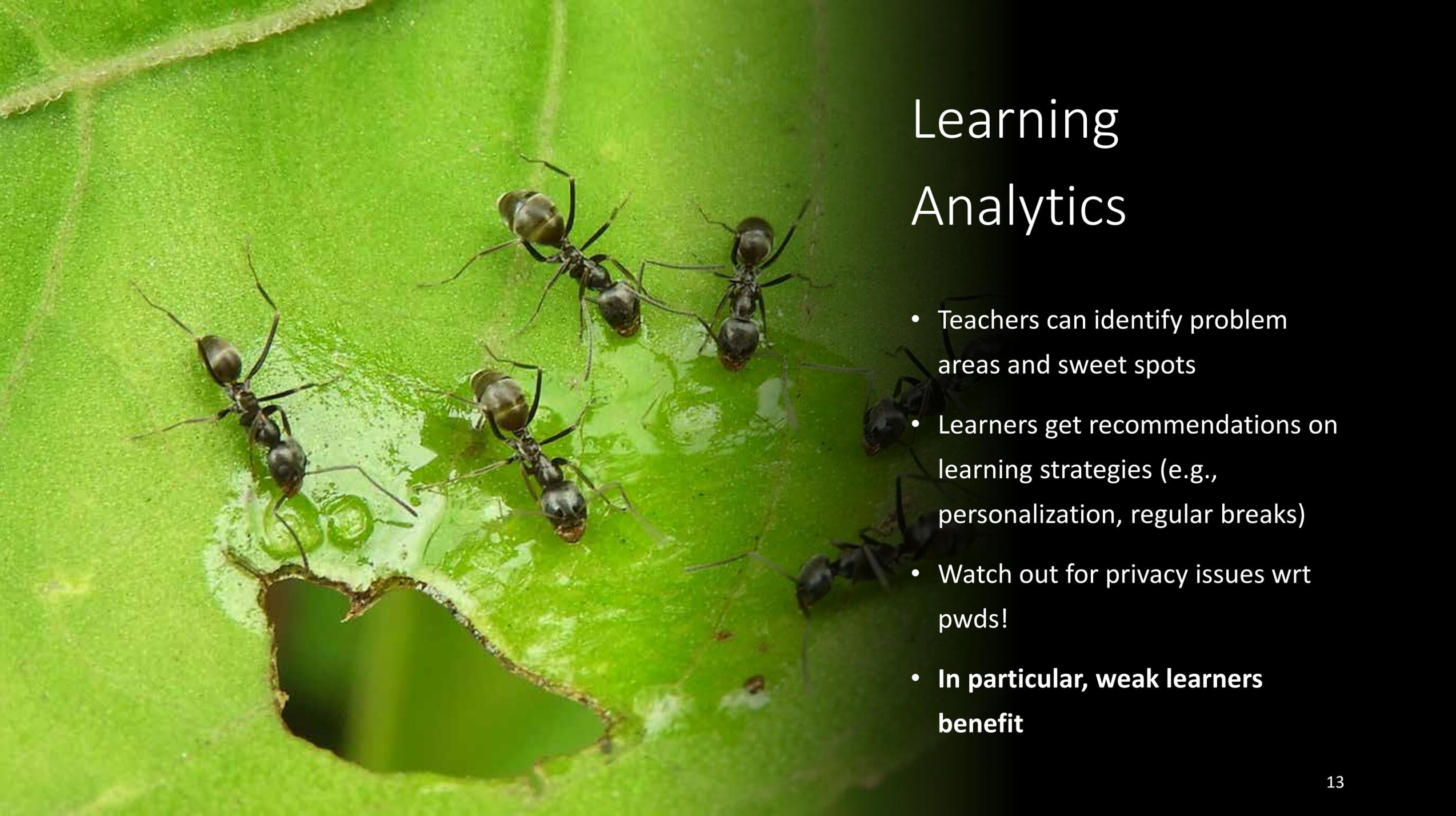
- Automatic speech recognition (AI) achieves usable results
- Manual edits can improve quality
  - Editing = learning?
- Automatic translation into other languages (easy language?)
- **Many students benefit from captions and translations!**



# Interactive Learning Script

Multimodal script in multiple tracks, mutually cross-linked:

- Video (including AD)
- Slides
- Captions
- Translations
- Learning as dialog (cf. Google Duplex)
- **All students benefit!**

A close-up photograph of a green leaf with a large, irregular hole. Several black ants are scattered across the leaf, some near the hole and others further away. The leaf's texture and veins are clearly visible.

# Learning Analytics

- Teachers can identify problem areas and sweet spots
- Learners get recommendations on learning strategies (e.g., personalization, regular breaks)
- Watch out for privacy issues wrt pwds!
- **In particular, weak learners benefit**



# Automatic Checking of Learning Materials

- Regular monitoring for online courses, including documents
- Automatic tools can discover 30-40% of all error types [1]
- **Many students benefit from accessible learning materials**

[1] Burkard, A., Zimmermann, G., & Schwarzer, B. (2021). Monitoring Systems for Checking Websites on Accessibility. *Frontiers in Computer Science*, 3, 1-17. <https://doi.org/10.3389/fcomp.2021.628770>



# Accessibility Policy

- Top-down strategy
- University-wide strategy
- Public announcements
- **Beneficial for those who care about a11y**



# Accessibility Maturity Model

- Continuous measurements
- Set (intermediate) goals
- Identify and target weak spots
- Report to management
- **Beneficial for students and employees with disabilities**

# Teaching on Digital Accessibility

- Include topics of digital accessibility in the curricula
- Offer certificates to students and teachers (e.g., IAAP)
- **Good for all students to acquire skills in digital accessibility**



# Interaction Spaces with Pwds

- Goal: Invoke empathy and understanding
- Ideal: Conversation with real pwds
- Second ideal: Meet interactive virtual pwds
- **Beneficial for all students (“know your user”)**

A group of dolphins is captured in mid-leap from the water. The dolphins are dark grey with lighter underbellies, and their dorsal fins are prominent. The water is a vibrant blue-green, splashing around the dolphins. The background is a dark, gradient overlay.

# Networking

Exchange between  
universities

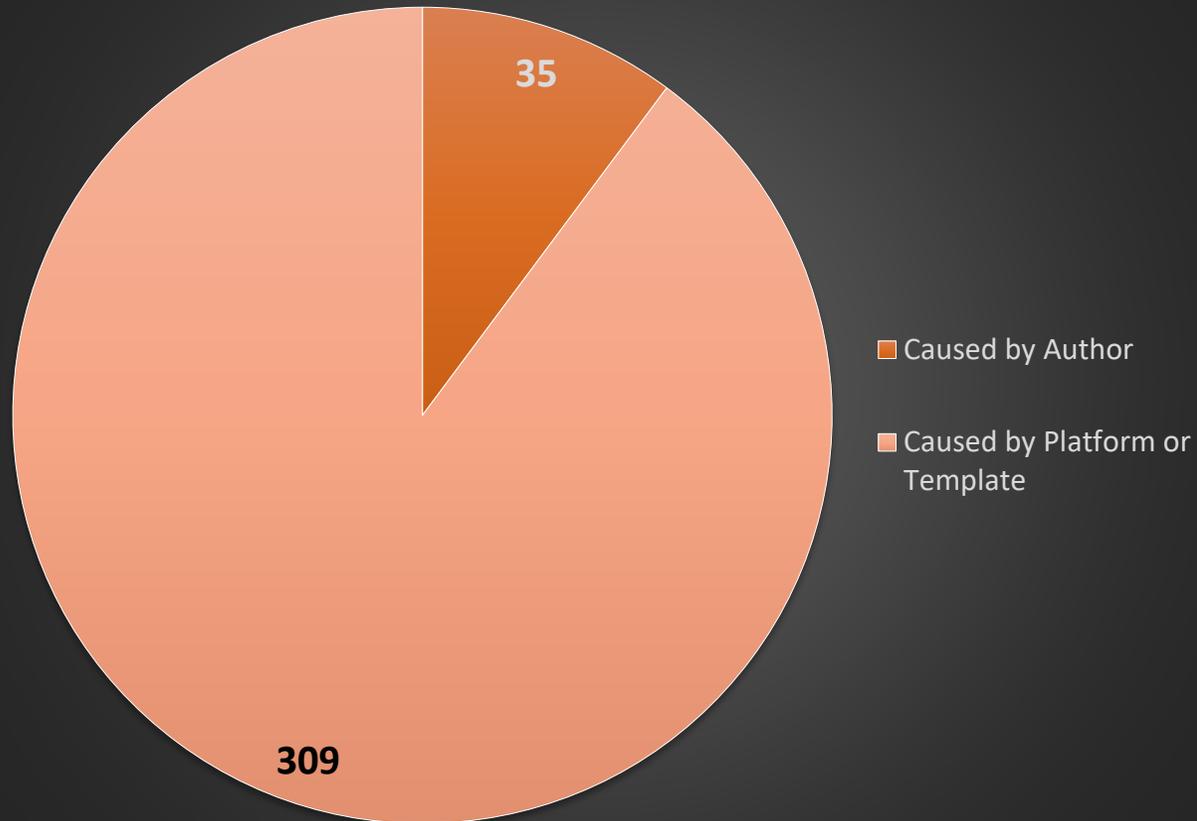
- Share experiences
- Share learning materials
- Share tools & platforms

# Support For Teachers

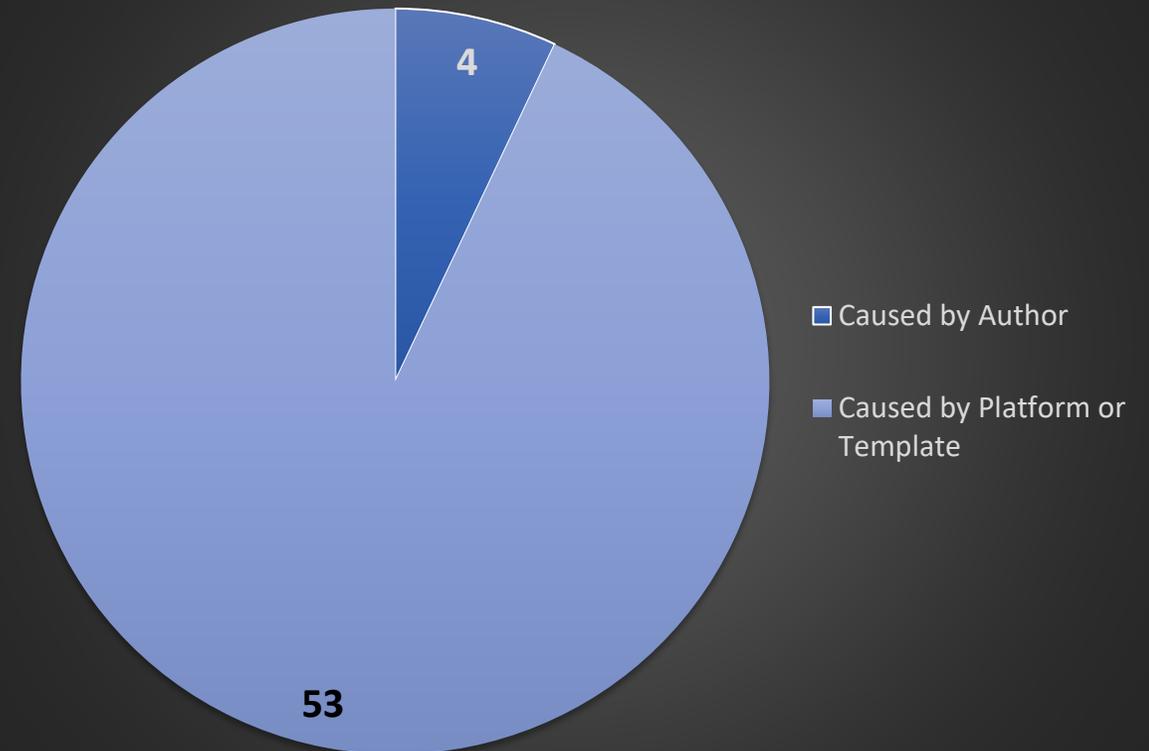
- Online courses
- Slides, documents, assignments, etc.
- Constantly changing
- Errors happen by ignorance and by accident

# Moodle Course: Error Instances

Manually detected errors (instances)

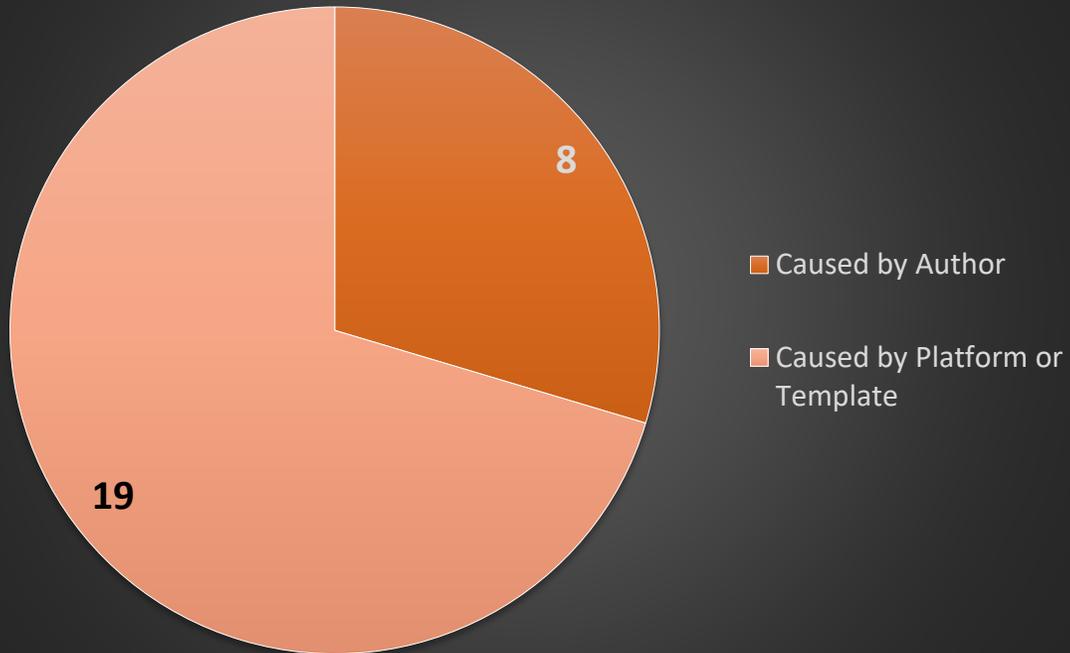


Automatically detected errors (instances)

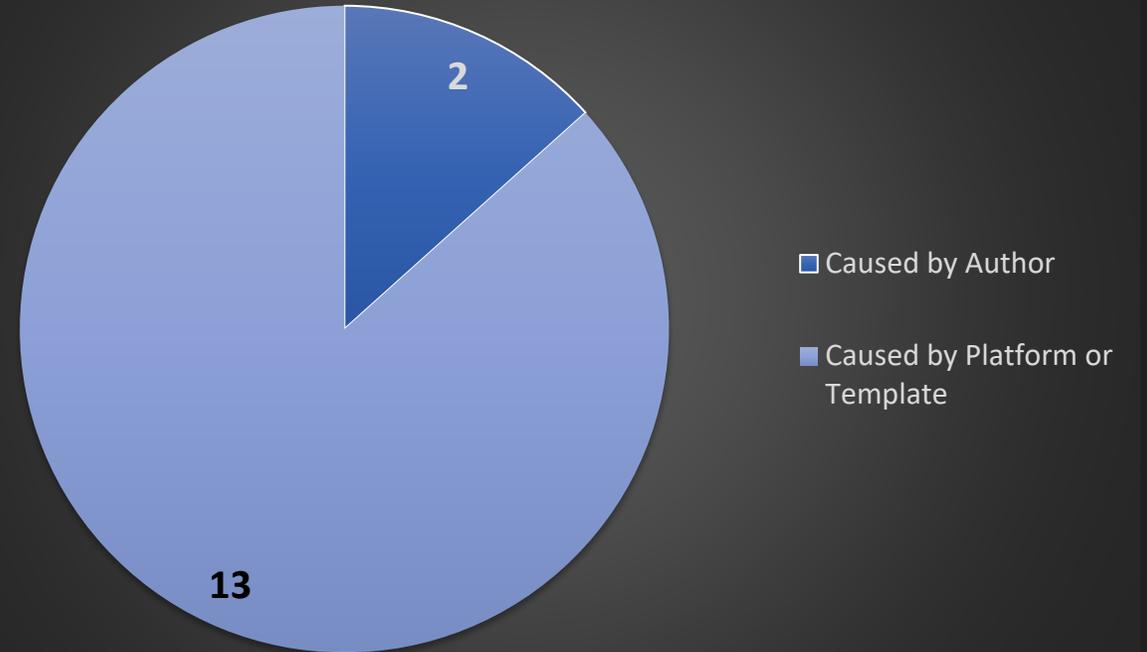


# Moodle Course: Error Criteria

Manually detected errors (criteria)

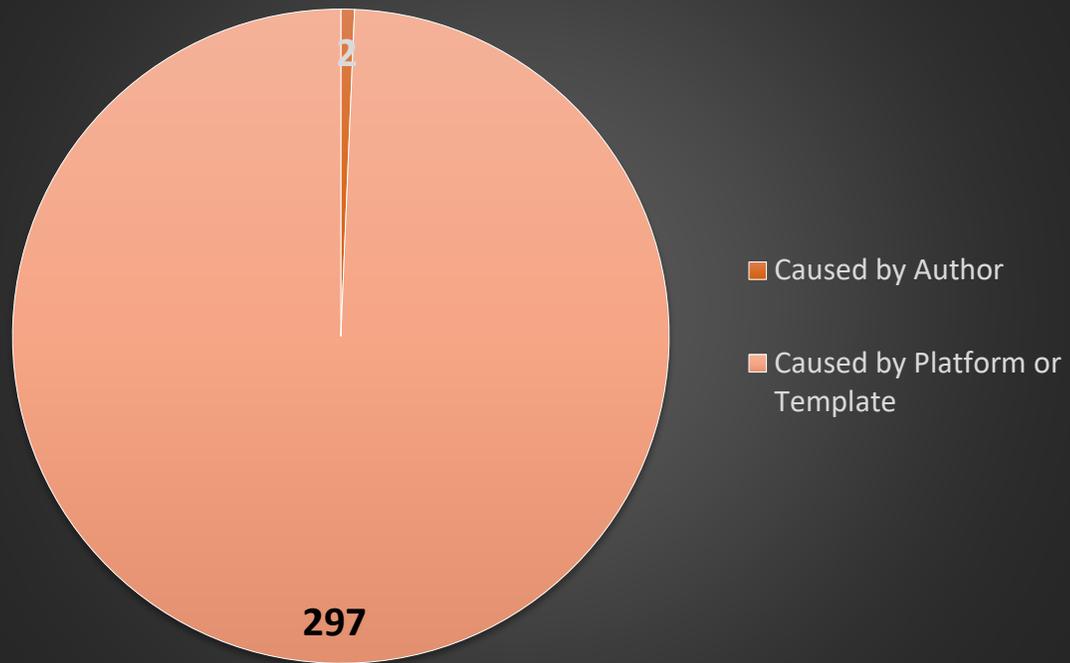


Automatically detected errors (criteria)

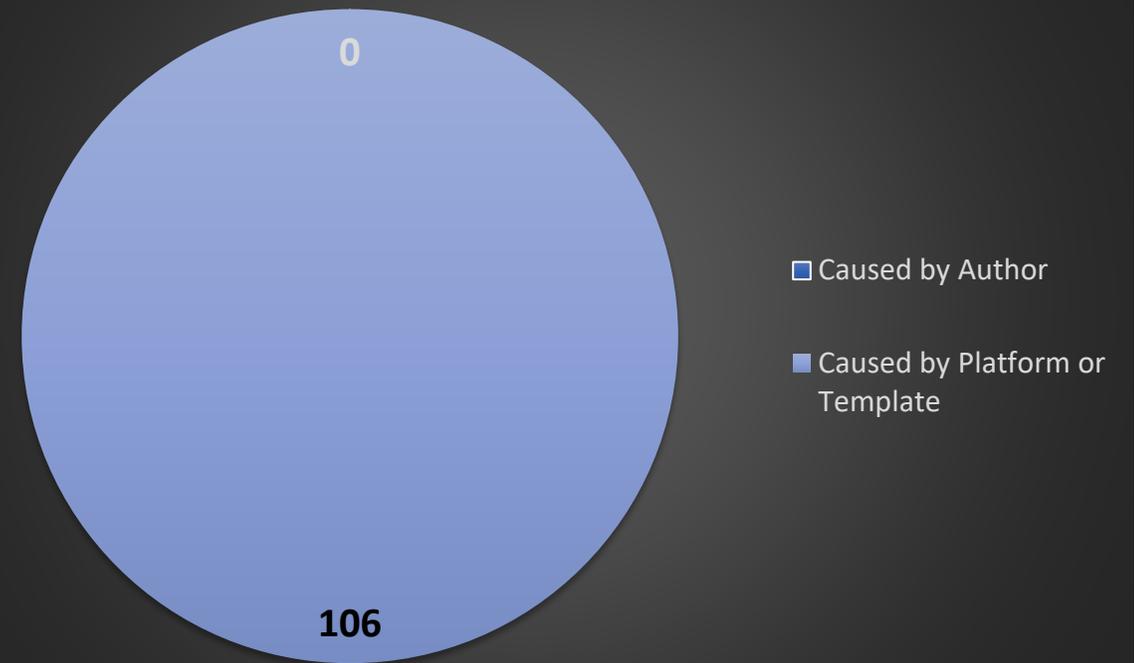


# ILIAS Course: Error Instances

Manually detected errors (instances)

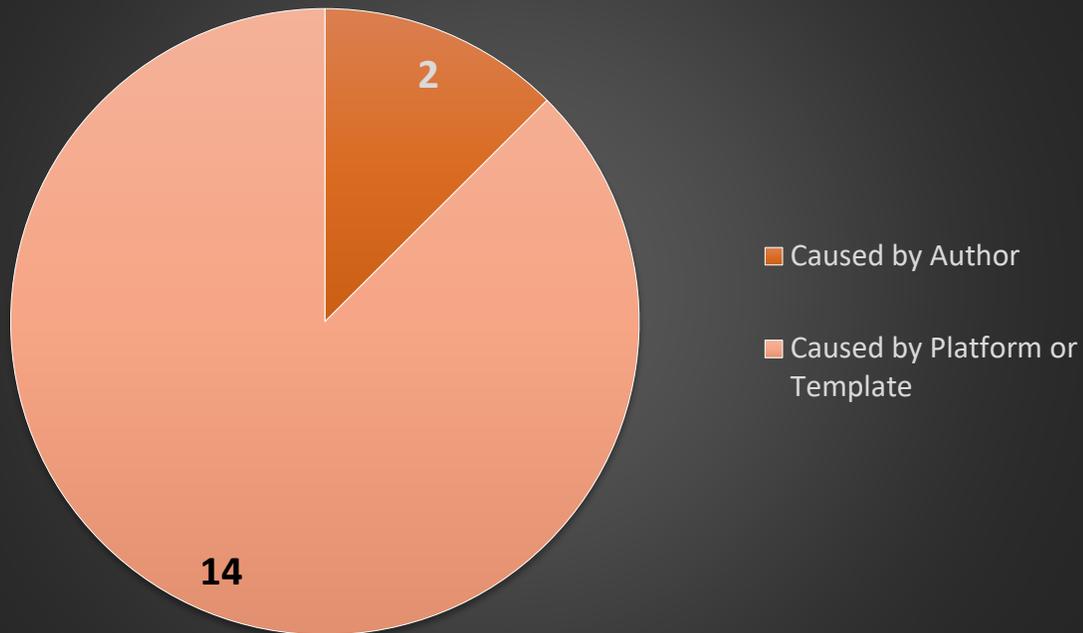


Automatically detected errors (instances)

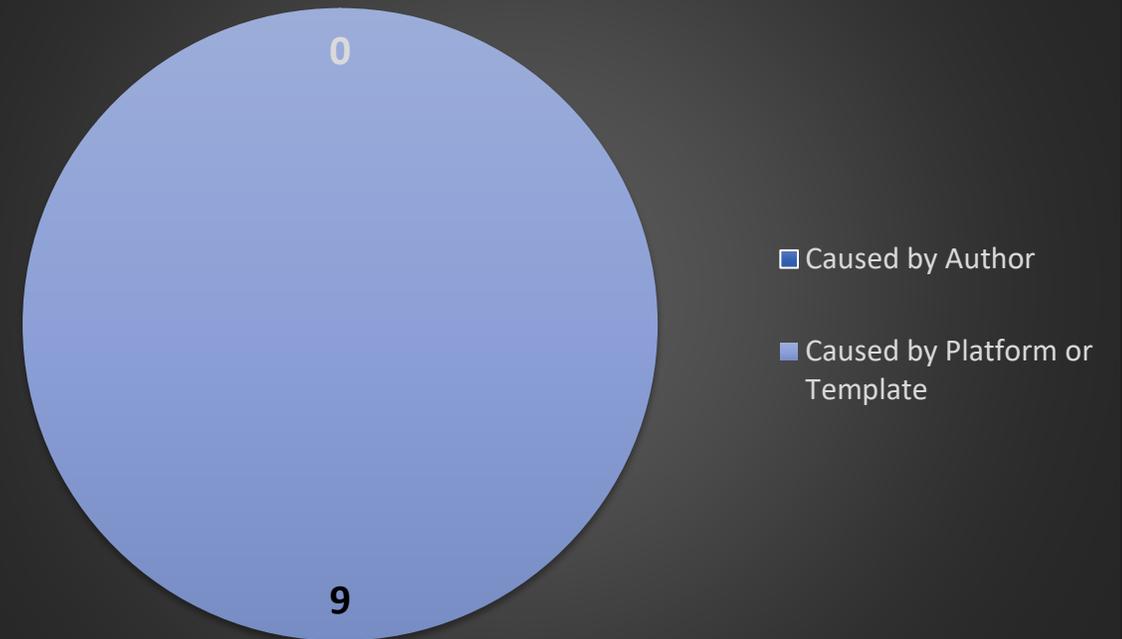


# ILIAS Course: Error Criteria

Manually detected errors (criteria)



Automatically detected errors (criteria)



# Merging Rules Into Categories

- (1) Structure & semantics
- (2) Navigation & orientation
- (3) Keyboard input
- (4) Text alternatives for images & non-text content
- (5) Videos: captions, audio description & sign language
- (6) Colors & text design
- (7) Animations, distractions, flickering, timeouts & interruptions
- (8) Support for form input
- (9) Touch, hand & finger operation
- (10) Communication by text, audio & video
- (11) Support, documentations & generated content
- (12) Personalisation

# Questions?

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