

# ICSE Academy

## Cluster 4

### SESSION 3

Innovative assessment practices and Equity in STEM classrooms: Assessing students with diverse learning needs

# Structure of the session

- **PART A** (70 min)
  - The focus will be specified on equity and assessment in STEM disciplines. Three chat activities (50 min)
  - Group activity 1 (20 min)
- **PART B** (20 min)
  - Group activity 2
    - Working on Cluster 4, session 3 homework assignment (10 min)
    - Presenting your ideas (10 min)

# Session activities

- Plenary presentations



- Whole class discussions/chat activities



- To participate in these discussions
  - you can either writing on the WEBEX-CHAT or raising your WEBEX-HAND

- Group work activity



- Share your ideas in the group and report them in a **google doc**

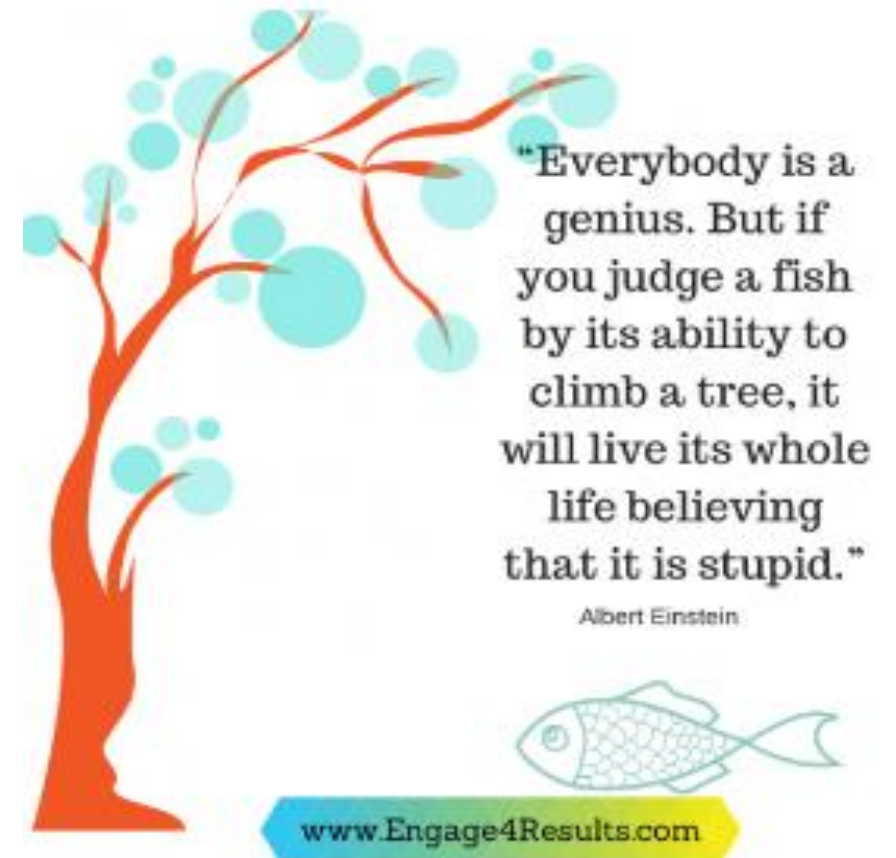
You are **all** kindly invited **to contribute** in these discussions and share your ideas and concerns

# Equity and assessment

«While there are *multiple ways for students to learn*, students need to demonstrate *learning in specific ways for it to count.*»

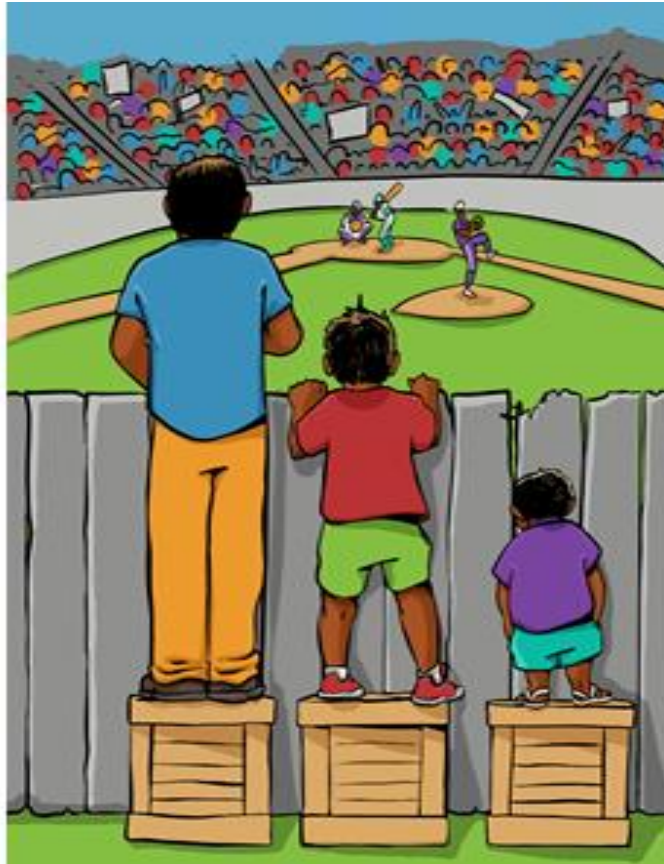
“An *assessment process* that is not mindful of equity can risk becoming a tool that **promotes inequities**, intentionally or not.”

Montenegro & Jankowski, 2020, p. 6.



[https://www.google.com/search?q=Everybody%27s+a+Genius+but+If+You+Judge+a+Fish+By+Its+Ability+to+Climb+a+Tree%2C+It+Will+Live+Its+Whole+Life+Believing+It+Is+Stupid&rlz=1C1GCEA\\_enGR947GR947&oq=Everybody%27s+a+Genius+++but+If+You+Judge+a+Fish+By+Its+Ability+to+Climb+a+Tree%2C+It+Will+Live+Its+Whole+Life+Believing+It+Is+Stupid&gs\\_lcrp=EgZjaHJvbWUyBggAEEUYOdIBCTMxNjZqMGoxNagCALACAA&sourceid=chrome&ie=UTF-8#vhid=Ae-3Rzp3iFkFhM&vssid=l](https://www.google.com/search?q=Everybody%27s+a+Genius+but+If+You+Judge+a+Fish+By+Its+Ability+to+Climb+a+Tree%2C+It+Will+Live+Its+Whole+Life+Believing+It+Is+Stupid&rlz=1C1GCEA_enGR947GR947&oq=Everybody%27s+a+Genius+++but+If+You+Judge+a+Fish+By+Its+Ability+to+Climb+a+Tree%2C+It+Will+Live+Its+Whole+Life+Believing+It+Is+Stupid&gs_lcrp=EgZjaHJvbWUyBggAEEUYOdIBCTMxNjZqMGoxNagCALACAA&sourceid=chrome&ie=UTF-8#vhid=Ae-3Rzp3iFkFhM&vssid=l)

# If the field of the game represents the 'classroom learning activities', what do these figures show?

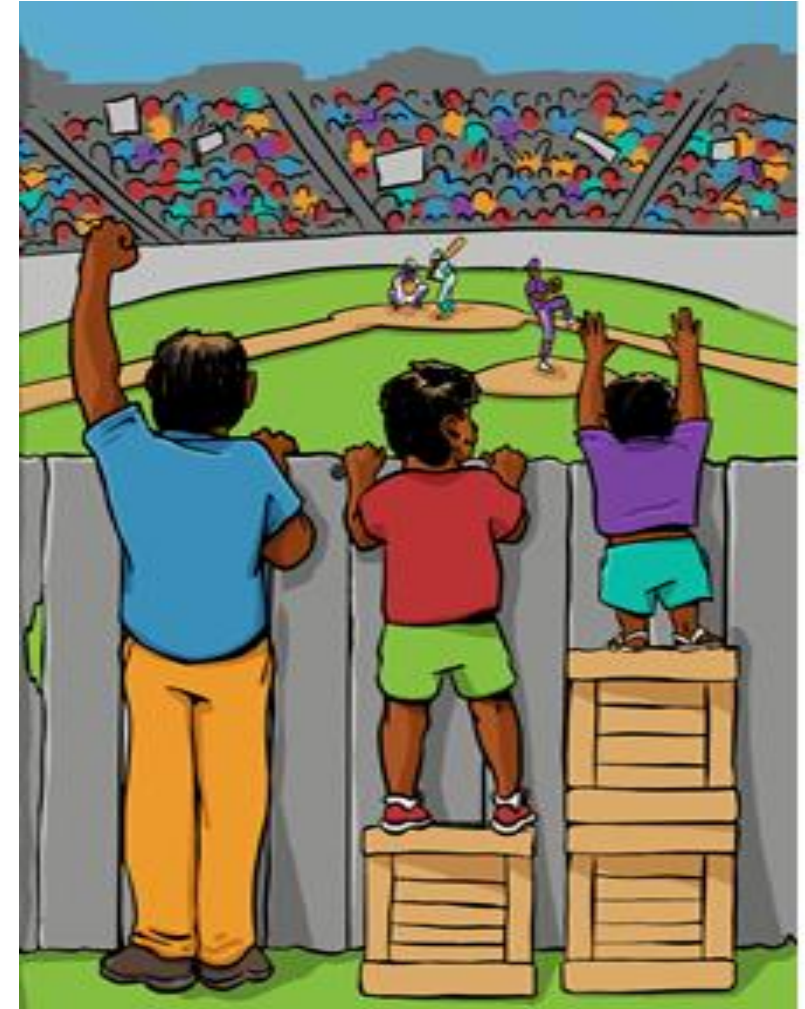


Chat activity



# Equity

- Equity addresses ways to remove barriers to participation in STEM disciplines and increase students' achievement



- **Assessment strategies** that support equity issues

# Str 1: Promoting equity through formative assessment (Assessment for Learning/AfL)

- Formative assessment can open more opportunities to promote **equity for learners** with **diverse needs** and **experiences**.
- Some key actions are...
  - Providing **effective questioning** and **feedback** by
    - *setting* precise and direct questions;
    - *taking into consideration students' socio-emotional needs* (e.g., affirmative feedback)
  - Activating students as **instructional resources for one another** (e.g., *use peer assessment methods*).
  - Activating students as the **owners of their own learning** (e.g., *use self assessment methods*).

Andersson, C. (2020).



# Str 2: “The Rights of the learners’ framework”

## Developing an inclusive classroom culture

### The learner in the classroom

- (1) has the right to **be confused**;
- (2) has the right to **claim ‘not understanding’**;
- (3) has the right to **speak, listen and be heard**; (*e.g., to contribute in classroom discussions; to ask Questions/share Ideas*)
- (4) has the right to **write, do** (*model with gestures and manipulate with tools*); and **represent** only what makes sense to her/him.

Kalinec-Graig, 2017

# Str 3: Keeping ‘Learners’ profile Diaries’ to describe the ways a student learns best

- A ‘learners’ profile diary’ could include information on students’ ...
  - **interests** (e.g., *reading, listening to music, playing sports*)
  - **learning styles** (e.g., *Analytic* that involves the linear type of learning found most often in schools; *Practical* that involves seeing how and why things work as people actually use them; *Creative* that involves making new connections and seeking innovation)
  - **Differences based on their gender/culture/personality** (e.g., *being expressive or reserved in class interactions; preferring competition or collaboration; preferring to work individually or in a group*)
  - **learning strengths and weaknesses**
- A learner profile needs to be **dynamic**, as individual learners are **constantly growing and changing**.

Thomas, et al., 2023; Tolminson et al., 2003

# Which one of the presented strategies is closer to your interest as a STEM teacher?

Chat activity



- Str 1: Promoting equity through **formative assessment (AfL)**;
- Str 2: **“The Rights of the learners’ framework”**  
Developing an inclusive classroom culture
- Str 3: Keeping **“Learners’ profile Diaries”**

# Video-clip on “What we can learn from the land about patterns?”

[https://www.youtube.com/watch?v=9Uf7\\_1NevGI&t=3079s](https://www.youtube.com/watch?v=9Uf7_1NevGI&t=3079s)

49:50 - 52:46

- This video-clip presents how the **land-based materials** can offer us ideas on **teaching and assessing students** about patterns/repetitions in elementary mathematics.
- After watching this video clip you will be asked to **adopt the idea presented in the video-clip while enacting the Air-quality problem in a STEM classroom.**



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Faculty of Education

## making, creating, and connecting to mathematics on the land

What different ways can students show what they know about patterns?

What new ways of thinking about patterns are possible by connecting to the land, using land-based materials and considering the seasonal patterns and cycles that can be experienced when outdoors?

## Group activity 1 (20 min)

# “What can the land/environment offer us in STEM education?”

Watch the video-clip and answer in the Google doc the following questions:

- a) How can you adopt the idea presented in the video-clip while enacting the Air-quality problem in your classroom?**
- b) How could this idea advance inclusion and equity?**
- c) Choose one STEM competence and suggest one learning outcome while assessing this idea in your classroom.**

*List of STEM competences: Communicating and presenting ideas and argumentation skills; problem solving and modelling; use of representations; working technically; applying scientific knowledge in response to perceived human wants or needs; understanding the changes caused by human activity and developing responsibility as an individual citizen; other...*

*List of learning outcomes for assessing students' learning: Generates, discusses, and chooses interesting questions to investigate/justify the most appropriate way to investigate; Uses scientific ideas to make testable predictions; Suggests more than one way to investigate the question; Identifies the variables in the investigation and explains the predicted relationships between the variables; other...*






# Members of Group 1-6 (from Cluster 4, session 1)

Please, the members of each group  
(who are participants and not TEs) find  
ways to communicate and work  
together.

**Group 1:** David, Maria Teresa, Laura,  
Betul, Ulrika, Giorgos







## Group 2

Names of group members:

-  **Anonymous** 10d  
Salvador Bueno
-  **Anonymous** 10d  
Pauline Hain
-  **Anonymous** 10d  
Ravza Hallac
-  **Anonymous** 10d  
Kerstin Thurner
-  **Anonymous** 10d  
Subhash Makwana

## Group 3

Names of group members:

-  **Anonymous** 10d  
Ourania Panagiotou
-  **Anonymous** 10d  
Stacey-Lee Einfalt
-  **Anonymous** 10d  
Despina Potari
-  **Anonymous** 10d  
Lotta Roth
-  **Anonymous** 10d  
Andreas Danner
-  **Anonymous** 10d  
Duygu Vonal


## Group 4

Names of group members:

-  **Anonymous** 10d  
Panagiota Bampourda; Nikolas  
Metaxas; Viliija Liudvinaviciene;  
Metin Sardag; Maxi Frei; Mapia




## Group 5

Names of group members:

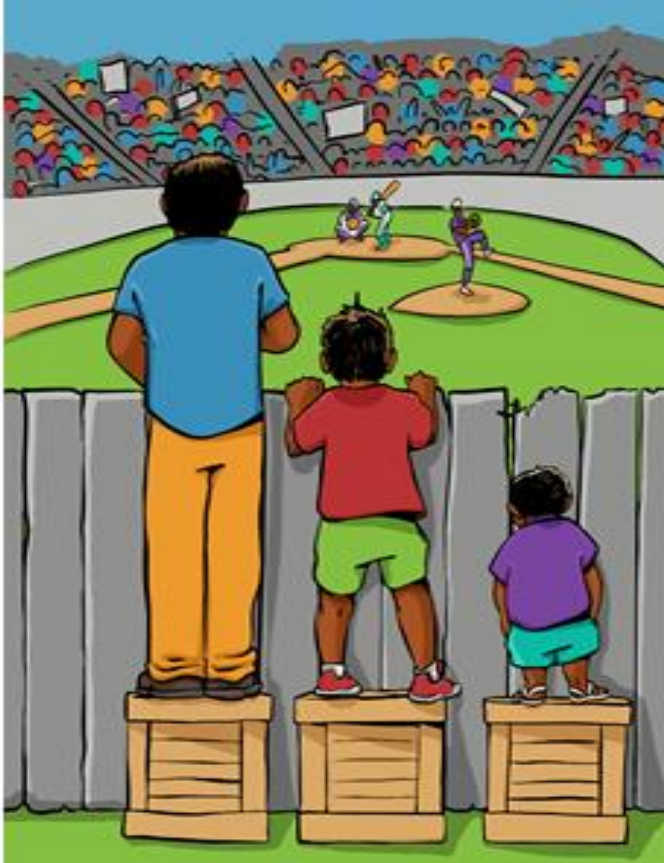
-  **Anonymous** 10d  
Mourad Karkri; Edward Thake;  
Koukiou Aleka, Isabel Rehl

## Group 6

Names of group members:

-  **Anonymous** 10d  
Stephanie Asciak
-  **Anonymous** 10d  
Reyhan Oz Yildiz
-  **katerina bogiatzi** 10d  
Katerina Bogiatzi

- Special cases



Who could  
be  
excluded?



Chat activity



# Special case I: Students with different cultural background

- **‘Culturally responsive assessment’**
  - **Culture** refers to explicit elements that makes people identifiable as a specific group(s) including background; language; religion; heritage, race/ethnicity etc.
  - **Responsive** means an action-based, urgent need to create contexts and curriculum that **responds** to the social, political, cultural, and educational needs of students

(Khalifa, Gooden, & Davis, 2016).



# Strategies for Culturally responsive assessment

- Provide assessment designs that are contextualized and **relevant to learners' lives/interests/funds of knowledge** (*e.g., the air quality in their own town/neighborhood*)
- Use **appropriate student-focused and cultural language** in learning statements to ensure students understand what is expected of them (*e.g., translate main notions in their own language or allow them to use a dictionary*).

# Special cases II: Students with learning disabilities

*Mild learning disabilities (e.g., dyslexia) or severe learning disabilities (e.g., physical, sensory or cognitive)*

Recommending assessment accommodations for students with learning disabilities

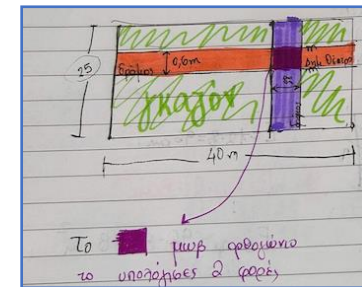
- Assessment accommodations
  - Changes/modifications made to an assessment procedure

# Assessment accommodations for students with learning disabilities

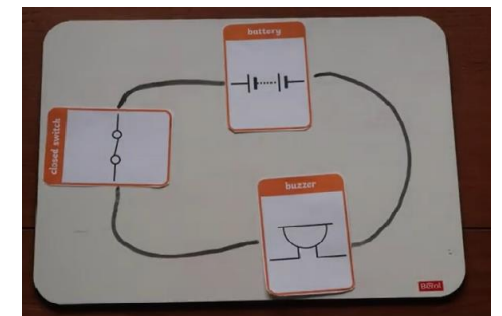
**Accommodations** are generally grouped into the following categories:

- Task presentation (*e.g., repeat directions, read aloud, use of larger bubbles on answer sheets or use of visual tools such as color-coding*)
- Use of reference materials such as **cue cards** (*designed in such a way to help someone to remember what to say by giving her a 'cue' or prompt*) or use of strategy steps (step 1 ....; step 2... etc.)
- Timing/Scheduling (*e.g., extended time, frequent breaks*)
- Setting (*e.g., special lighting, separate room*)

Cortiella, C. (2005)



**Color-coding** is the use of colors to represent data values on a task.



# Summing up: How do I ensure my assessments are equitable for all students?

- Use multiple assessment methods/tools
- Provide reasonable accommodations
- Use clear language that is understood by all
- Be specific and transparent about what you are expecting of them.

counter any implicit biases <https://cei.umn.edu/teaching-resources/assessments/equitable-assessments> when creating and grading assessments

PART B (10 mins)

Cluster 4 Session 3

Homework assignment- Group Activity 2

For a specific age group respond to the following question:

**How would you assess pupils' learning while working on the Air Quality problem in equitable ways?**

- **Refer to possible adaptations in your assessment designs for only one of the special cases *presented before* i.e. either students with different cultural backgrounds or students with learning disabilities.**

*Hinds: You may suggest modifying some of the STEM competences or the learning outcomes or the assessment tools that you will use; You might incorporate ideas presented on Cluster 2, session 3 on diversity (slides 17, 18) as well as on Cluster 4, sessions 1 and 2.*

# Each group's deliverable

- **Design a poster (or ppt) where you report on the tasks (homework assignments) presented in Sessions 1, 2 and 3.**
- **Deadline: June 18**

**Please, the members of each group (who are participants and not TEs) find ways to communicate and work together. THIS IS A GROUP ACTIVITY!**

**Questions for clarification**

# Selected References

- Andersson, C. (2020). Formative assessment – from the view of special education teachers in mathematics. *Nordic Studies in Mathematics Education*, 25 (3-4), 73–93.
- Cortiella, C. (2005). No Child Left Behind: Determining Appropriate Assessment Accommodations for Students with Disabilities. *National Center for Learning Disabilities*.
- Harris, C. J., Wiebe, E., Grover, S., & Pellegrino, J. W. (2023). Classroom-Based STEM Assessment: Contemporary Issues and Perspectives. *Community for Advancing Discovery Research in Education (CADRE)*.
- Heritage, M., & Wylie, C. (2018). Reaping the benefits of assessment for learning: Achievement, identity, and equity. *ZDM*, 50(4), 729-741
- Kalinec-Craig, C. A. (2017). The rights of the learner: A framework for promoting equity through formative assessment in mathematics education. *Democracy and Education*, 25(2), 5.
- Montenegro, E., & Jankowski, N. A. (2020). A new decade for assessment: Embedding equity into assessment praxis (Occasional Paper No. 42). Urbana, IL: University of Illinois and Indiana University, National Institute for Learning Outcomes Assessment (NILOA).
- Nortvedt, G. A., & Buchholtz, N. (2018). Assessment in mathematics education: Responding to issues regarding methodology, policy, and equity. *ZDM*, 50(4), 555-570.
- Thomas, R. K., Strekalova-Hughes, E., Nash, K. T., Holley, M., Warner, C. K., Enochs, B., ... & Ricklefs, M. (2023). The learner profile: piloting a tool to support contextualized understanding of the learner. *Journal of Early Childhood Teacher Education*, 44(3), 349-372.

LINK

<https://elvlc.educ.ubc.ca/culturally-responsive-mathematics-assessment/>