



International
Commission on
Mathematical
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ICMI

ICMI Online Seminar Series for Capacity Building: Strengthening mathematics teacher education

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Members of the ICMI Executive Committee

12th October 2026

Video recording of the session

- used for further mathematics teacher educators
- if you want to stay anonymous, exchange your name and avoid video
- if you want to be visible, but not on the video, tell me to stop the recording before speaking





Goals and expected outcomes:

- establish international dialogue on good content-specific practices to strengthen mathematics teacher educators
- break the isolation that usually characterizes the work of Mathematics teacher educators as they continuously work on improving their teacher education practices.
- hear from experienced mathematics teacher educators report on their work and offer core activities for individual adaptation in other contexts
- share and discuss across countries the highly valuable practical work with specific mathematical content

Structure: Each seminar in the series is structured as a two-hour online meeting, with

- 45 min input from an experienced and inspiring mathematics teacher educator
- 45 min try out of illustrative activities and discussion about potential adaptations in breakout rooms with similar contexts
- then 30 min plenary discussion

First speaker: Anjum Halai

- Anjum Halai is a highly experienced international educationist focusing on mathematics education and research in the context of low-income and middle-income countries.
- Her research interests are in issues of social justice in education due to marginalization on the basis of language, gender, conflict or other forms of exclusion.
- She is Professor & Vice Provost at the Aga Khan University in Karachi Pakistan.
- Served as ICMI Vice President 2021-2024





THE AGA KHAN UNIVERSITY

Language-supportive Teaching in Mathematics

Lessons for Teacher Educators' Practice

ICMI ONLINE SEMINAR SERIES | INAUGURAL SESSION

Professor Anjum Halai

12th October 2026



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Languages in the world



Subtractive language policies



Additive language policies



Dynamics of students' participation

- Safe Talk
- Choral response
- Short or one-word responses
- Emphasis on procedure
- Active
- Exploratory talk
- Inquiry and questioning.
- Language is the main tool for students' active participation as they express their ideas and communicate using language.

TCF Language ladder

An illustrative example from Pakistan

A transition protocol designed to systematically bridge the gap as a child's transitions from local home language to regional or international languages

Build Foundations in Mother Tongue and Regional Languages from Pre-Kindergarten until Grade 3:

Gradually Transition to National and Foreign Languages in Grades 4 through 7 using Multilingual Instruction

Rely on a National or Foreign Language as the Medium of Instruction for Grade 8 Onwards

Source: <https://www.tcf.org.pk/mother-tongue-based-multilingual-education/>



THE CITIZENS FOUNDATION

Language Ladder for pilot in Tharparkar

Grades	Dhatki	Sindhi	Urdu	English	Math	Theme Based
Nursery	Dhatki	Sindhi				Dhatki + Sindhi
KG	Dhatki	Sindhi			Dhatki + Sindhi	Dhatki + Sindhi

Grades	Dhatki	Sindhi	Urdu	English	Math	Science	SST/PST	Islamiat/ Ethics
1	Dhatki	Sindhi	Urdu (o)		Sindhi	Sindhi	Sindhi	Sindhi
2		Sindhi	Urdu	English (o)	Sindhi	Sindhi	Sindhi	Sindhi
3		Sindhi	Urdu	English	Sindhi	Sindhi	Sindhi	Sindhi
4		Sindhi	Urdu	English	Sindhi (+Eng)	Sindhi	Sindhi	Sindhi
5		Sindhi	Urdu	English	Sindhi (+Eng)	Sindhi (+Eng)	Sindhi	Sindhi
6		Sindhi	Urdu	English	Sindhi (+Eng)	Sindhi (+Eng)	Sindhi (+Urdu)	Sindhi
7		Sindhi	Urdu	English	Sindhi (+Eng)	Sindhi (+Eng)	Sindhi (+Urdu)	Sindhi (+Urdu)
8		Sindhi	Urdu	English	English	English	Urdu	Urdu
9		Sindhi	Urdu	English	English	English	Urdu	Urdu
10		Sindhi	Urdu	English	English	English	Urdu	Urdu

o = oral

*This language ladder is among other essential components of MTB-MLE Program

Transitions in learning mathematics

Language transitions in multilingual contexts

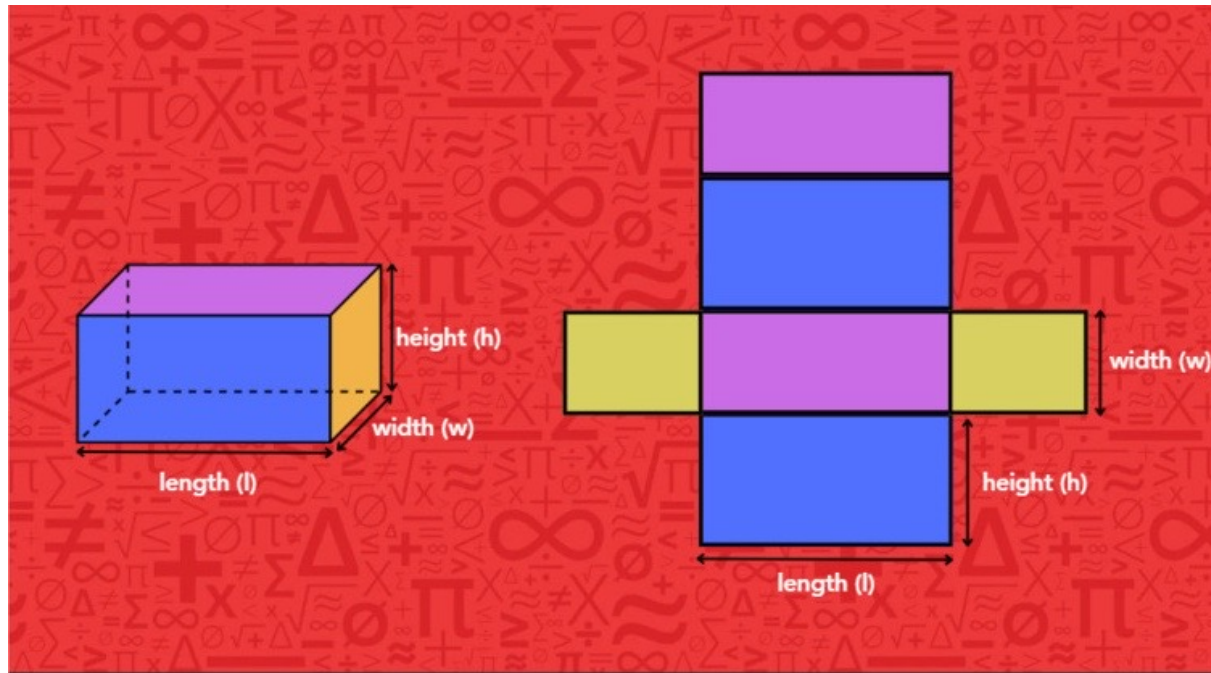
- First language to Lol (if different)
- National to global
- Verbal (Informal) to verbal (formal)

Representational transitions

- Concrete
- Visual
- Verbal
- Abstract notational

Area and Perimeter

- **Perimeter** is the total distance around the outside edge of a closed two-dimensional shape and is measured in units.
- **Area** is the amount of space occupied by a closed flat shape and is measured in square units.



Surface area of a rectangular prism

Formula $SA = 2(lw + wh + lh)$

Source: <https://www.mathnasium.com/mathcenters/hydepark/news/surface-area-rectangular-prism>

Area and Perimeter

Language Transitions

- Concepts names and words in different languages carry within them meanings that potentially support conceptual learning.
- Discuss how the words below relate to the concept of perimeter or area.

Area and Perimeter

Language Transitions

Omtrek: (Dutch for ‘around-track’)

گھیرا (Ghera): (Urdu for
‘outer edge around a (circular) space’)

احاطہ (Ahaata): (Urdu for ‘total
boundary’)

Perimeter: (English for ‘outer
edge’ or ‘boundary of a space’)

Keliling: (Indonesian for ‘walk
around’)

Other ?

Oppervlakte: (Dutch for space
inside)

رقبہ Raqbah: (Urdu for a piece of
land/plot, enclosed space)

Area: (English for ‘neighbourhood’
or ‘region’)

Other?

Breakout session

Tasks for language supportive teaching

In your groups, work on the assigned mathematics tasks and address the following questions:

1. What formal mathematics language/vocabulary must students know?
2. What types of transitions would students need to learn the formal mathematics language/concepts?
(e.g., transitions between concrete, visual, verbal and symbolic representations, between informal to formal mathematics language, other).
3. How would you enable these transitions?
(e.g., multiple representations, code switching, unpacking informal terms, other)

Mathematics word problems

Problem 1:

A goat is tethered by a 6-metre rope to the outside corner of a shed measuring 4 metres by 5 metres in a grassy field. What area of grass can the goat graze?

Problem 2:

A circle of radius ' r ' is inscribed in a square of side ' $2r$ '. Investigate the relationship between the area of the square and the circle.

Problem 3:

The length and breadth of a rectangular park are 615 m and 550 m, respectively. Find the cost of fencing the park at the rate of \$ 9.25 per metre.

Source: <https://www.math-only-math.com/word-problems-on-area-and-perimeter.html>

Mason, J., Burton, L, & Stacey, K. (1985). *Thinking mathematically*. Essex, England: Prentice Hall.

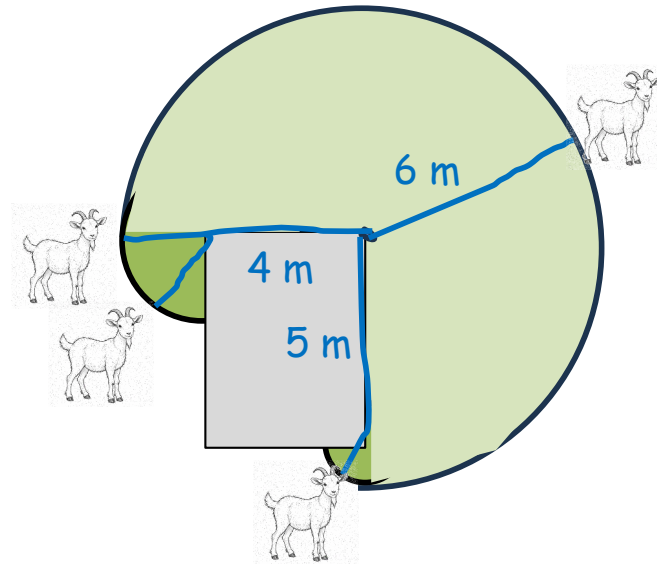
Plenary discussion

- Group representative will be invited to present briefly (5 minutes) on the language and mathematics ***transitions*** that students would make in working through mathematics task.
- Time permitting there will be an open discussion.

Solution for Problem 1

Problem 1:

A goat is tethered by a 6 metre rope to the outside corner of a shed measuring 4 metres by 5 metres in a grassy field. What area of grass can the goat graze?



The goat can graze in $\frac{3}{4}$ of a circle with radius 6m

The goat can also graze in $\frac{1}{4}$ of a circle with radius $(6-5) = 1\text{m}$ around one corner of the shed.

The goat can also graze in $\frac{1}{4}$ of a circle with radius $(6-4) = 2\text{m}$ around another corner of the shed.

Total area the goat can graze is ?

Language learning outcomes:

- the rope **forms the radius** of the large light green circle
- when the rope is **along the 5m side**, only 1m is **left**
- when the rope is **along the 4m side**, only 2m is **left**
- only **parts of the circles** are accessible

Potential aspects for collective reflection

- What could your pre-service teachers learn from the work with the worksheet?
- How do the three word problems differ
 - in their mathematical demands?
 - in their language demands?
- Why could it be important to identify the language demands?
- What else can we do to prepare pre-service or in-service teachers for language-supportive teaching?

Potential questions for Anjum

- What did your pre-service teachers particularly learn from the work with the worksheet?
- What else do you do to prepare pre-service or in-service teachers for language-supportive teaching?
- What is particular for the low-income context you work in?



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Thanks a lot, Anjum!

Where to find Anjum's materials and today's video in the future?

<https://www.mathunion.org/icmi/icmi-capacity-building-seminars>



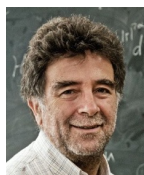
Next sessions:



Ruchi Kumar
(India)

Friday, November
27, 2026

Creating mathematical possibilities:
What under-resourced contexts teach us about
teacher development



**Patricio
Felmer**
(Chile)

Tuesday, January
12, 2027

Promoting preservice teachers' mathematical
problem-solving experiences



Nicky Roberts
(South Africa)

Monday,
February 15,
2027

Two pathways into number:
A starting point for primary teachers with insecure
maths foundations

... to be
continued

Further information: <https://www.mathunion.org/icmi/icmi-capacity-building-seminars>

References

Halai, A., & Muzaffar, I. (2016). Language of Instruction and Learners' Participation in Mathematics: Dynamics of distributive justice in the classroom. In A. Halai & P. Clarkson (Eds.), *Teaching and learning mathematics in multilingual classrooms: Issues for policy and practice* (pp. 57–72). Rotterdam: Sense Publishers.

<http://tinyurl.com/qzrk4k6>

Halai, A. (2004). Teaching and learning mathematics in multilingual classrooms. In *Proceedings of the 28th Conference of the International Group for the Psychology of Mathematics Education* Bergen Norway, 1, 22–234. <https://www.igpme.org/wp-content/uploads/2019/05/PME28-2004-Bergen.zip>

Uribe, Prediger et al. (2025). Unpacking mathematical concepts. sima.dzlm.de/um/multiple-languages
<https://sima.dzlm.de/language-responsive-and-multi-language-responsive-mathematics-teaching>

<https://multilingualmath.nl/western-norway-university-of-applied-sciences/>

UNESCO (2016). *If you don't understand, how can you learn.* <https://en.unesco.org/news/40-don-t-access-education-language-they-understand>

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Thank you

