Plato missed the point! The social and political flesh and blood of mathematics education

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Balsa Muisca


Bogotá – 8’000,000 pop.


Denmark, Aalborg – 160,000 pop.

An introductory remark

Plato missed the point!

The *social* and *political*

flesh and blood

of mathematics education

My thesis

- The role of mathematics education and the constitution of the school subject mathematics change in different historical times according to the function they are given in a social organization.
- Recent studies in the philosophy and the strong sociology of mathematics propose different assumptions about the ontology and epistemology of the generation of mathematical knowledge.
- Our ideas about how mathematics education is social and political cannot be left unexamined.

My proposal for today

- Why Plato “missed the point”
- A socio-political perspective
  - Roots
  - What’s the social
  - What’s the political
  - Implications
  - Examples in research

A snapshot of a classroom...

It is a hot summer day in the northern hemisphere. In a high school mathematics classroom, pupils are doing trigonometry and it's difficult. Only a few seem to engage with the assignments that have just been handed out by the teacher. He is waiting to see how they cope with them before throwing a helping hand to those in trouble. Most of the students are not making much progress. They are having a hard time dealing with the sine and cosine functions and actually only a fraction of them has really understood what the assignment demands. Instead, they are focusing on each other and on people that are not in the classroom right now…

Teacher (thinking): I have to remember to leave the car keys behind for Line, otherwise she won't be able to pick up the kids tomorrow…

Ali (a pupil) is on the verge of texting from his mobile phone….

Teacher: Ali STOP THAT right now or I will confiscate your mobile!

Ali (thinking but saying it all aloud with his eyes): Fuck you, man! Can't you see I'm busy? I have to find some way to join the party on Friday. I won't let Maria be there alone… Ken will be there, he will get her and…

Teacher (thinking): He is totally and utterly lost when it comes to mathematics. He will never pass the course no matter how much time we put into him from now on. He only disturbs the others. He will never be able to learn mathematics; he's just not got what it takes…

Meanwhile Louise (another pupil) is almost done with the assignment.

Teacher (thinking): But Louise… she has got it right as the first one once again. I should persuade her to do the advanced mathematics next year. Quiet unusual for a girl to put this effort into math…

Louise (thinking): Piece of cake! I can't believe the others are so lazy. They don't do anything and exams are just around the corner. I wonder if the exam will have this topic. It's easy!

Ali succeeds in sending his text to the proper destination. He still has no clue about the assignment. It doesn't even enter his mind that it would be possible to solve one single problem with a couple of minutes of hard effort because he tried that years ago and didn't succeed at all; he has never experienced a "well done" or "correct", only red ink on returned assignments that clearly reads *"you just can't do it"*.

Louise finishes, looks around at her classmates, most of whom are still not showing any signs of doing mathematics. She fiddles her pencil around and flips through her textbook to see if she could find some more entertainment. She is also thinking about the party on Friday and whether she will be able to persuade her mum to buy her that cool blue top she so desperately wants.

The teacher walks around and patiently assists the few students showing a bit of interest in the assignment. He then takes a look at Louise's assignment and is once again surprised at her precision and speed.

Later that summer Louise receives yet another set of top grades and decides to continue with advanced mathematics. She has a dream of becoming a medical doctor so she needs the good grades. She wants to be like her dad and continue the family tradition of going through university. Ali gets one of the lowest term grades in the class and it will only add to a number of grades that are equally low in other subjects reinforcing his experience of being incapable of learning anything. Just like his siblings and parents. This boy was definitely born with the wrong genes…

From Christensen, O. R., Stentoft, D., & Valero, P. (2008). Power distribution in the network of mathematics education practices. In K. Nolan & E. De Freitas (Eds.), *In(ter)ventions in mathematics education*. New York: Springer.

Some questions...

- Is it likely that such an episode can actually take place in any of your classrooms?
- Why?

What is behind the episode?

Mathematics learning is an intrinsic capacity of individuals

A failure in mathematics learning is blamed on individual characteristics

“The cards are, so to speak, dealt with” even before children meet school mathematics

A link to Plato

All individuals have had a glimpse of the world of ideas —including the mathematical ideas— but not everyone has received the same skills from birth to explore it.

Only those with gold in the soul are meant to have access to the world of the ideas and to mathematics.

Mathematics education is a privileged means of making “the gold in the soul shine”

But the world has changed...

In ancient times:

- Education for the elite
- Education for developing the soul
- Mathematics as the essence of the natural world
- Mathematics for the selected few

In modern times:

- Education for all
- Education mainly for training a working force
- Mathematics as a human activity like many others
- Mathematics a basic competence for the masses

In recent times:

- Mathematics education as part of larger social projects of consolidation or construction of democracy
- Mathematics education as a necessary competence in globalization and internationalization
- Mathematics education for maintaining economic competitiveness

What does this mean?

- Mathematics cannot keep on being conceived as separated from human beings and from their social organization
- Mathematics education is immersed in the social world and does not only occur to have access to “the world of the ideas”

What are (school) mathematics and mathematics education really about?

And why should I study if...

José said:

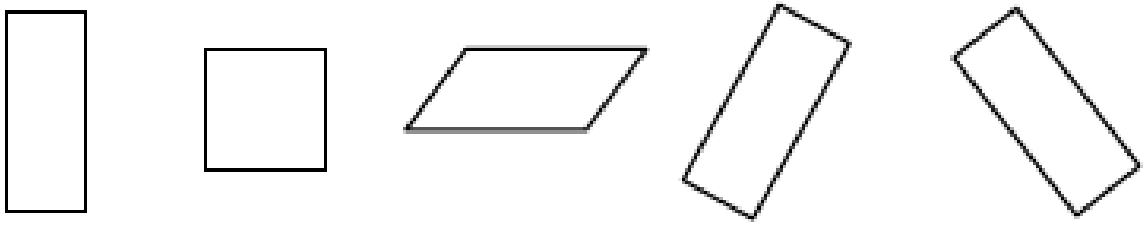
"The only class I would like to pay attention to is English because I want to get out of this fucking place and go to the USA. Though, I don't even manage to say 'Hello, good morning"

School mathematics and social class

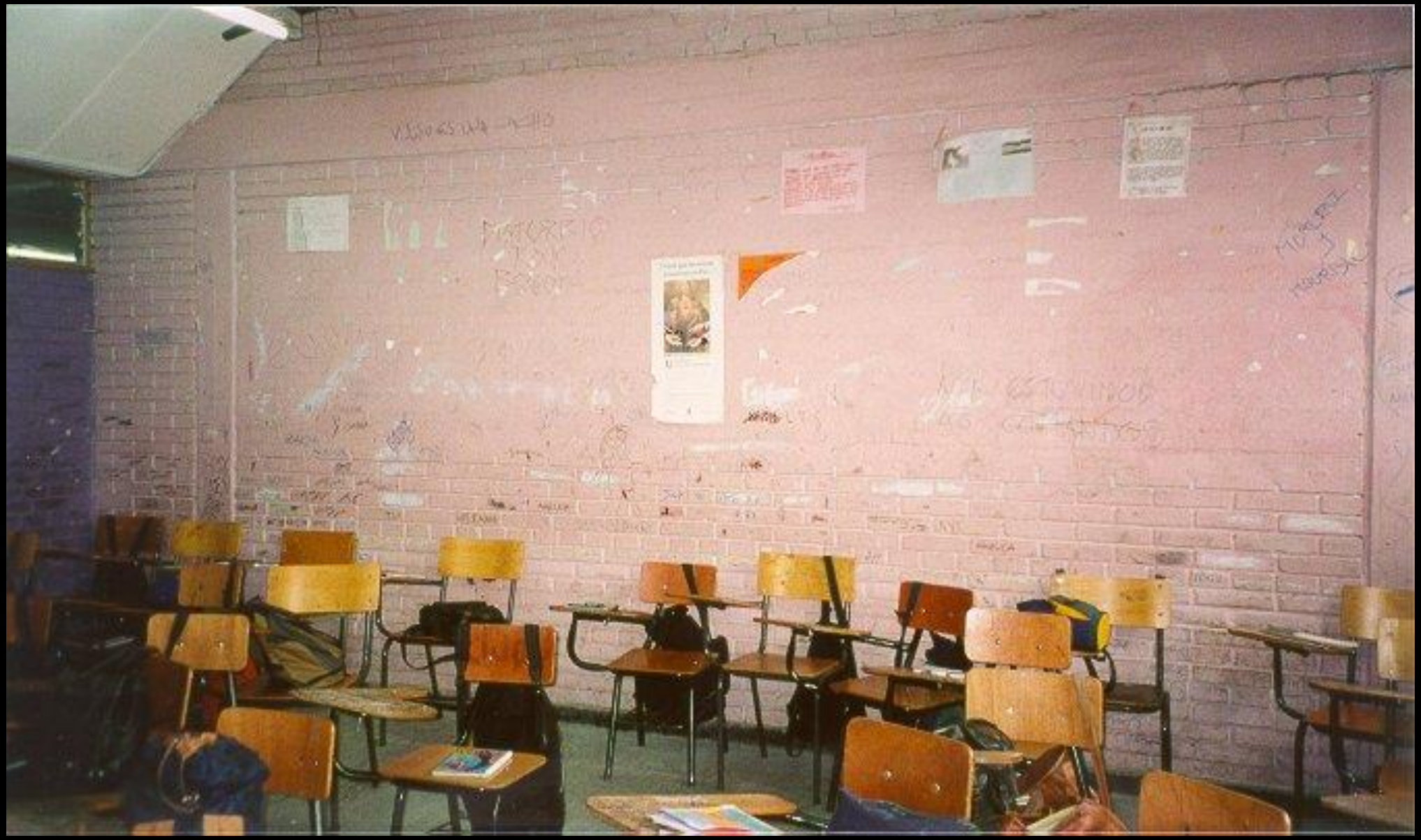
Robyn Zevenbergen (In Lerman and Zevenbergen, 2004)

Suppose you had a garden this shape and you were in a helicopter right above your garden looking down on it.

Which of the following shapes would be like yours?



- The students who did not answer correctly were working-class students
  - My garden is not like this. It is a square.
  - There is no garden in my house. I live in an apartment block.
  - I've never taken a ride in a helicopter!
- Interpretation:
  - Students answers do not signal a lack of recognition fo geometrical shapes
  - Mismatch between the linguistic habits of working-class students at home and school's linguistic habits



Looking for alternative views

- Which are the roots of socio-political research in mathematics education?
- What does it mean to adopt a socio-political approach?

The roots

Steve Lerman (2006)

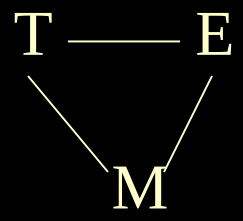
The “social turn” in mathematics education

- Is it a problem that many students don’t succeed in school mathematics?
  - Who does not succeed?
  - Why?
  - What are the consequences?
- Search of conceptual frameworks to “see” these phenomena

Different perspectives in mathematics education research

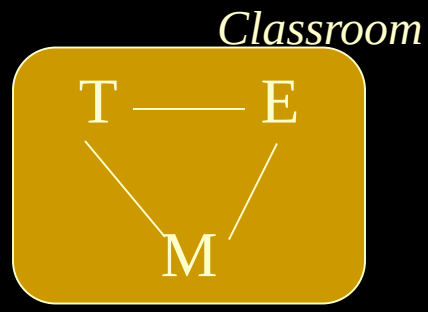
A *psychological–cognitive* perspective

Mathematics education studies the learning of mathematics and mathematical thinking processes between students and teachers as a result of instruction



A *socio–cultural* perspective

Mathematics education studies processes of transmission of mathematical culture and the processes of meaning construction around the content of mathematical activities in a classroom community



A socio-political perspective

Mathematics education studies the historically-situated, social processes through which concrete human being get involved in the creation and re-creation of diverse forms of knowledge and ways of reasoning related to mathematics

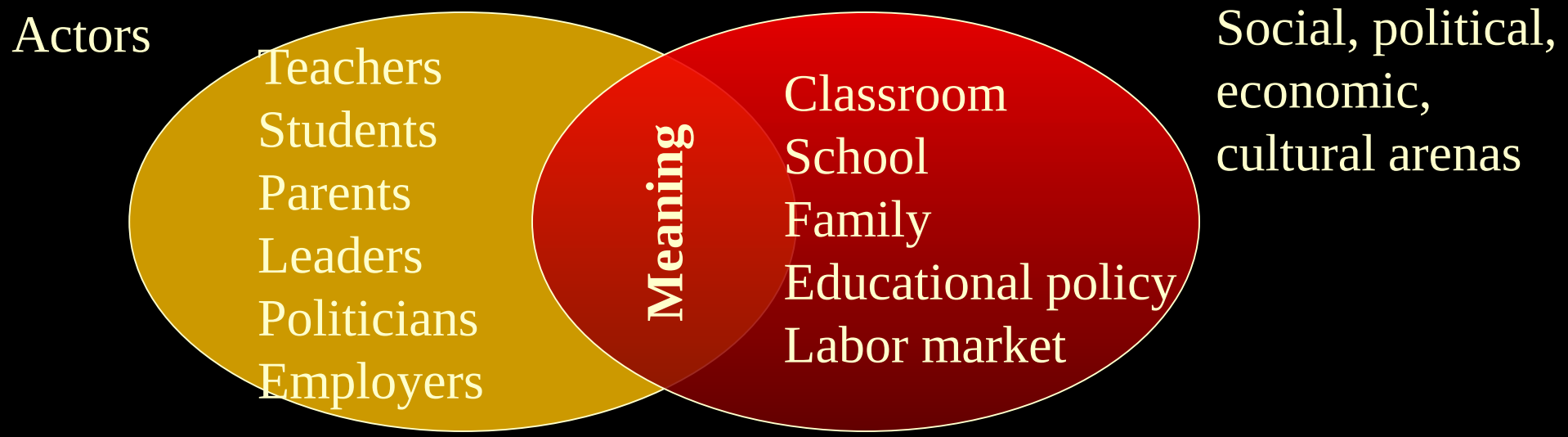
The social: question

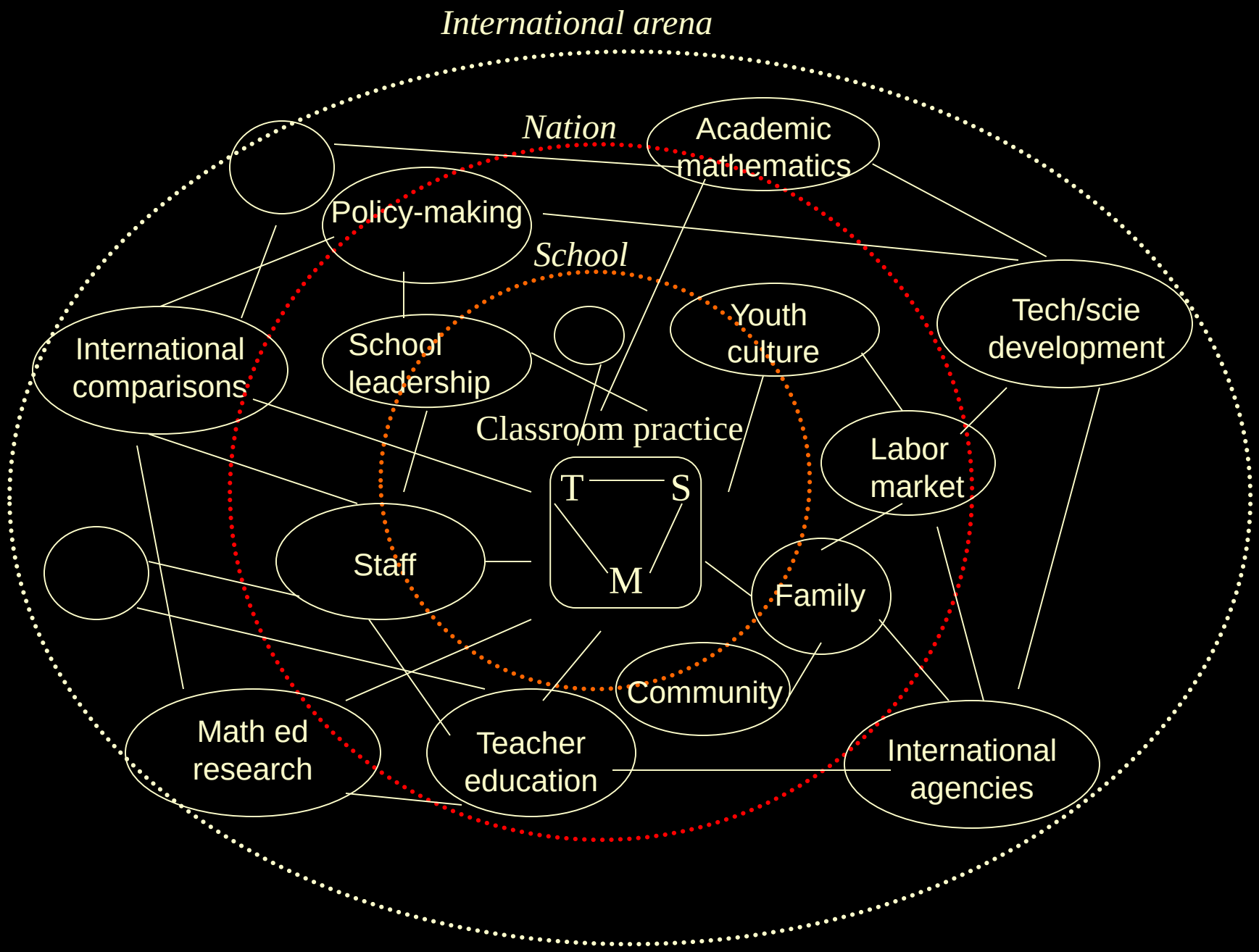
What is “the social”
in mathematics education?

The social

Mathematics education is seen as a *network of social practices*

The meaning of learning and teaching mathematics is constructed in the relationship between:





Network of mathematics and science education practices

The political: A question

What is “the political”
in mathematics education?

The political in mathematics

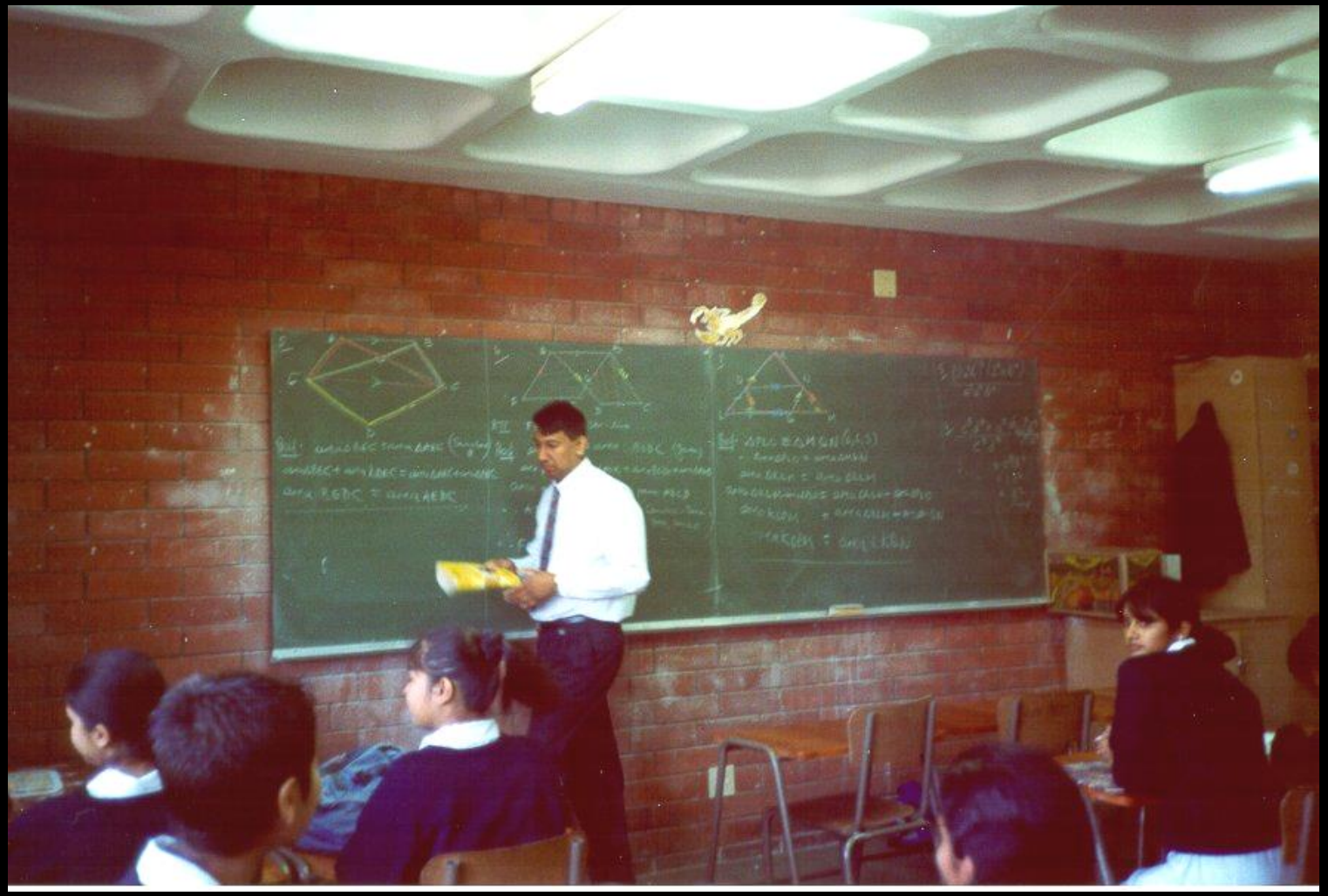
In a modern social organization, mathematics is a resource for action in social life

- Knowledge created and used by social agents
- Resource to act upon the world, in relation to other knowledge resources (science) and other forces (economy, technology)
- Generation of products that allow constructing and and transforming the social world, relations and even risk structures

Power and math education

- There are worldviews underlying teaching and learning (ideology)
- There are models about ways of thinking and acting within and outside the school that determine what is legitimate/illegitimate
- Social actors position themselves in more/less influential roles in relation to other actors through the use of mathematical knowledge
- There are possibilities to open/deny access to the use of mathematics as a resource for social action

Challenges for math educators



- Mathematics is not a neutral knowledge, but rather a knowledge/power which human beings use as a resource in social action to achieve certain goals and promote certain worldviews.
- Mathematics are not only a body of well defined, delimited knowledge, but rather a set of many different ways of knowing associated to different socio-cultural and political practices (The ethnomathematical postulate).

- Mathematics education practices are not only cognitive, but also and specially social and political. Teaching and learning mathematics are historically constructed, collective processes through which forms of acting and thinking are valued as valid, legitimate and desirable (while other forms are excluded).
- The problems of mathematics education are to be located at an individual as well as in a collective level in a multiplicity of social arenas.

- Researching those practices demands a detailed analysis of power; that is an analysis of how social actors use mathematical resources to position themselves in influential positions, and in the exclusion of others
- A socio-political research tackles the complexity of the network of mathematics education practices. It does not restricted to individuals or the classroom

Examples of research

Math education, democracy and social justice

Skovsmose, O., & Valero, P. (2002). Democratic access to powerful mathematical ideas. In L. D. English (Ed.), *Handbook of international research in mathematics education: Directions for the 21st century* (pp. 383-407). Mahwah, NJ: Lawrence Erlbaum Associates.

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The construction of disability in the school organization of mathematics education

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Communication conflict and learning in the multicultural mathematics classroom

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