

VI Jornades d'Innovació Docent en Matemàtiques en Educació Superior

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Federico Ardila Mantilla (SFSU and QMUL)'s 'Todos cuentan'¹ Axioms

Axiom

1. Mathematical potential is equally present in different groups, irrespective of geographic, demographic, and economic boundaries.
2. Everyone can have joyful, meaningful, and empowering mathematical experiences.
3. Mathematics is a powerful, malleable tool that can be shaped and used differently by various communities to serve their needs.
4. Every student deserves to be treated with dignity and respect.

¹ Notices AMS November 2016, <https://www.ams.org/publications/journals/notices/201610/rnoti-p1164.pdf>

What this means for pure mathematics (and algebra)

Axiom

1. Mathematical potential is equally present in different groups, irrespective of geographic, demographic, and economic boundaries.

Strong gender, race, sexual orientation, etc imbalance with clear geographic and economic prevalence of Western, 'first' world countries

2. Everyone can have joyful, meaningful, and empowering mathematical experiences.

Poor mental health

3. Mathematics is a powerful, malleable tool that can be shaped and used differently by various communities to serve their needs.

'Uselessness of pure mathematics'

4. Every student deserves to be treated with dignity and respect.

Toxic working environments, folk pedagogy

Points of action

“From each according to their power and ability, to each according to their needs” (paraphrasing K. Marx). Some standard ways to help:

- ▶ Getting involved in associations,
- ▶ Mentoring, networking and coaching younger generations; allyship;
- ▶ Targeted positions;
- ▶ ...
- ▶ Today: **democratization of teaching and learning in pure mathematics, with a view towards equality/equity, diversity, inclusion and social justice.**

An apology

Quote (Sir M. F. Atiyah²)

*'The aim of theory really is, to a great extent, that of systematically organizing past experience in such a way that the next generation, our students and their students and so on, will be able to absorb the essential aspects in as **painless** a way as possible, and this is the only way in which you can go on cumulatively building up any kind of scientific activity without eventually coming to a dead end.'*

²'How research is carried out', Bulletin IMA., 10:232–234, 1974.

Two experiences in the UK and Spain: unraveling the strategy

Context: two lectures (“Lie algebras” at Cardiff University, Wales; “Algebra seminar” at Universitat de València, Spain). Small class size, M.Sc. level, not compulsory.

Before the lecture

- *EDI-profiling the students* (‘The EDI checklist’);
- *Lecture plan aligning learning outcomes with learning activities and assessments, providing alternatives based on students needs;*
- *Diversification of lecturing and evaluation methods, with a proactive and flexible view towards new ones.*
- *Accessibility of learning materials beforehand, ‘lecture appetizers’;*

Context: two lectures (“Lie algebras” at Cardiff University, Wales; “Algebra seminar” at Universitat de València, Spain). Small class size, M.Sc. level, not compulsory.

During the lecture

- *Giving freedom of choice to study (and be evaluated);*
- *Ideas flowcharts as a recap (both for results and concepts);*
- *Stimulate curiosity and critical thinking through direct action (and with each other);*
- *Collection of all ideas and materials generated during class;*
- *The power of metaphoric language and demystification.*

Context: two lectures (“Lie algebras” at Cardiff University, Wales; “Algebra seminar” at Universitat de València, Spain). Small class size, M.Sc. level, not compulsory.

After the lecture

- *(If needed,) Completion of all learning materials;*
- *Offline (mutual) support;*
- *Regular, even informal, check-ups with students (‘two stars and a wish’);*
- *Strategic interventions to improve networks.*

Pros and cons, and homework

Overall, very positive experiences; however:

- ▶ Quite personalized learning experience, difficult also to repeat year after year;
- ▶ Heavily relying on small, handy sizes;
- ▶ Fine line to walk workload-wise;
- ▶ Personal vs professional;

And some pending tasks:

- ▶ Bringing this setting to larger audiences;
- ▶ Better, quicker EDI adjustments;
- ▶ The AI Challenge;
- ▶ ...

Thank you for your attention!

Time for questions :)

Or, email anytime to ana.ros.camacho@uv.es !

