ICMI column

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The ICMI Database Project: Mathematics curricula all over the world

The term curriculum has its roots in the ancient Roman culture and in the classical Latin verb *currere*, whose closer meaning in modern English could be 'to run.' The running or race metaphor is certainly inspiring. It suggests many ideas, from that of competition with those most rapid winning the race, to that of movement with learners, teachers, families and curriculum developers experiencing together the running. A certain meaning of *currere* can thus expand the educational experience of the curriculum beyond the syllabus, the course, the materials or the objectives of teaching and learning. *Currere* is not then the race to be won, but rather the race or path to be run. In the context of mathematics education and conceived broadly, *currere* can be viewed as a collaborative move towards the progressive understanding and learning of mathematical concepts and structures to be used in practice. For this to happen, educational systems all over the world need to select and interpret mathematical and pedagogical contents, human, symbolic and material resources …, which is far from trivial.

In 2011, the International Commission on Mathematical Instruction (ICMI) launched the Database Project.[1] The ultimate goal of this project is to build and update a database of the mathematics curricula at different levels of instruction over the world. Across the pre-tertiary stages, most mathematics curricula are largely regulated under country policies, whereas at the tertiary stage these curricula are often decided at the more local level of each particular university. The future consideration of university curricula, including mathematics in courses for prospective mathematics teachers, will need a multi-case approach within countries, differently from the common single-case approach for pre-tertiary curricula. At present, pre-tertiary mathematics curricula of 37 countries listed in alphabetical order from Argentina to United Kingdom are documented. The collection of data for each entry is organized through summaries – provided by country representatives – and links to institutional local webpages with curricular texts and guidelines. With the valuable support of the country representatives, this information remains updated over time and, when possible, expanded. *Currere* is, of course, more than links to curricular texts and guidelines. Nonetheless, as we learn about these data, we learn about mathematics curriculum too.

Two more related accounts of the strong interest of ICMI in issues of curricula are (1) the concluded ICMI Study 24, 'School mathematics curriculum reforms: Challenges, changes and opportunities' (for the discussion document, the study conference, and the conference proceedings, visit the website[2]), and (2) the forthcoming Springer volume, 'Mathematics curriculum reforms around the world: The 24th ICMI Study',[3] edited by Yoshinori Shimizu (Japan) and Renuka Vithal (South Africa). The ICMI Study 24 and the Database Project both adopt a defining cross-cultural lens in the approach to the mathematics curriculum. Considering these ICMI projects and their particular similarity in this regard, we may wonder: Why is the collection and presentation of cross-cultural curricular data important for mathematics education? I will next argue that it is important for two reasons at least, and I will illustrate these for the specific case of the Database Project.

A first reason is that collecting and presenting cross-cultural curricular data is important in order to learn from and through diversity. The Database Project reflects and represents an enormous diversity of curricula – and curricular cultures – covering mathematical contents that exist with respect to both student age and country variation. Representations of diversity are always important, because they allow us to foresee and discuss alternatives other than those initially imagined. If mathematics teachers, curriculum developers, stakeholders and researchers have the opportunity to situate their perspectives on curricula in relation to other perspectives in a larger context, they also have the opportunity to learn by contrast and perhaps infer some common lessons. A second reason is that collecting and presenting cross-cultural curricular data is important in order to understand the cultural nature of the mathematics curriculum, and likewise any other subject curriculum. The mathematics curriculum is cultural, not only because it is produced within institutionalized sites, but also because beliefs,

[1] https://www.mathunion.org/icmi/activities/icmi-database-project

[2] http://www.human.tsukuba.ac.jp/~icmi24

[3] https://www.springer.com/series/6351

values and unwritten rules mediate decisions about what to design, teach, learn and assess, and by whom.

Notwithstanding the foregoing, the collection and presentation of cross-cultural curricular data is indeed challenging. Again, I will argue that it is challenging for two reasons at least, which I will illustrate for the singular case of the Database Project. A first reason, especially present in this project, is the language for communication of curricular data. While some countries have English as one of the languages of their curricular texts, hence links to webpages in English are possible, these are exceptions. English summaries, prepared in collaboration with the country representatives, precede texts in the respective official languages. It is still feasible, however, that country-based teams consulting the Database Project may have some people who know one or two more languages other than those official in their context. When this is not the case, there can be other options. A Spanish team has easy linguistic access to the data from Argentina, Colombia, Costa Rica, Cuba, Paraguay, Peru …, although there may be different meanings attached to the same words in use across countries. The Spanish word *evaluación* is a clear example, with some countries using the word in institutional documents to express a focus on assessment of learning and some others to involve rating and performance of programs and educators. A second reason that makes the cross-cultural nature of the Database Project challenging is the necessary caution and concern over the course of any comparison or association. Cultural and societal differences between Eastern and Western approaches to pedagogy, mathematics and mathematics education, for instance, cannot be disregarded in the cross-reading of some entries like those from France and China. As said above, a common language at the level of words and sentences does not imply common interpretations.

Be it a challenge, a strength or both, the very conception of the Database Project makes it an ongoing project that is never complete, because of continuous expansion and updating. This is a 'match' with *currere* itself. The mathematics curriculum is also an ongoing project, never finalized regardless of the country. Any set of decisions, texts and actions is alive. It is regularly assessed and it will be revised after some years for redesign and, hopefully, improvement and adjustment to societal changes and to newer research findings.

If you are interested in adding to the Database Project, or if you have comments about some of its entries, please let me know at nuria.planas@uab.cat. I would love to hear from you! You may have experience of other projects, either ongoing or completed, that share some common challenges with the Database initiative. Just this past December, Tomás Recio sent written reflections gained over the course of his participation in European projects with researchers from different countries, all considered as belonging to Western traditions, who mentioned rather different aspects of one curricular mathematical content but named them the same. That message from Tomás resonated with my current participation in a mathematics education research and developmental project with colleagues in England and Germany. When I talk about the Thales theorem as a curricular content in the secondary school mathematics in Spain, I will support my talk with the drawing of two lines in a plane, two segments in one of them, some parallels … to conclude around a proportionality between ratios. If it is my colleague in Germany, for instance, who talks about Thales theorem in her context of secondary school mathematics, she will support her talk with the drawing of a circumference, three distinct points on it with two of them representing the extremes of a diameter … to conclude around the creation of a triangle with a right angle. Thales, born in the wealthy Greek Miletus, is definitely credited with more than two theorems, all beautiful and basic in geometry education. But then again, the Database Project is for connecting and making meaning of mathematical curricular choices that are cultural.

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[4] https://www.mathunion.org/icmi/icmi-newsletter-december-2022#on-page-6